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CONTENTS

ARTHUR WILLIAM BADEN POWELL (1901-1987) Page
A brief biography and bibliography with a list of Molluscan taxa.
W. O. CERNOHORSKY 1

ARCHAEOLOGY AND ETHNOLOGY
Pa and external terraces with structures at Poor Hill (site P5/227), Waimate North.
ANNE LEAHY 39
Source determination of obsidian from the Westfield (R11/898) site using geochemical analysis.
R. S. RUDDOCK 49

APPLIED ARTS
A Broadwood square pianoforte in the Auckland Institute and Museum.
ANGELA R. ANNABELL 57

ZOOLOGY
Taxonomic notes on the *Mitromorpha* group of the Family Turridae (Mollusca: Gastropoda: Borsoniinae).
W. O. CERNOHORSKY 63
The Mitridae, Costellariidae and Nassariidae recently dredged at Reunion Island, Indian Ocean, with descriptions of new species.
W. O. CERNOHORSKY 75
Records of birds and reptiles from Tonga.
B. J. GILL 87
A revision of the Genus *Mimopeus* (Tenebrionidae).
J. C. WATT 95
Sand-dune tiger beetles of northern New Zealand coasts (Coleoptera: Cicindelidae).
K. A. J. WISE 147
Lacewings and aquatic insects of New Zealand. 4. New records and further distributions for Neuroptera.
K. A. J. WISE 181

INDEX 185

A.W.B. POWELL

Editor

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Volume 4, 1950 — Volume 6 No.3, 1967

Arthur William Baden Powell (1901-1987).
Left. In his late forties. Right. In his early seventies.

ARTHUR WILLIAM BADEN POWELL (1901-1987) A BRIEF BIOGRAPHY AND BIBLIOGRAPHY WITH A LIST OF MOLLUSCAN TAXA

W. O. CERNOHORSKY

AUCKLAND INSTITUTE AND MUSEUM

Arthur William Baden Powell, known to everyone as "Baden", died on the 1st July 1987 at the age of 86 from a stroke he suffered a week earlier. He was a conchologist of the old school like his colleagues Tom Iredale (1880-1972) in the Sydney Museum and Bernard Cotton (1905-1966) in the Adelaide Museum. Baden Powell made an outstanding contribution to New Zealand Malacology and also laid the groundwork for the study of the extensive family Turridae. He was a keen field worker and an accomplished artist who illustrated his papers either through excellent line drawings or photographs. As a taxonomist he was a "splitter" rather than a "lumper" and always considered clinal variants worthy of a scientific name. New Zealand Malacology has lost a dedicated researcher and a fine human being.

PERSONAL

Arthur William Baden Powell was born on the 4th April 1901 in Wellington, the son of Arthur Powell and Minnie Wilhelmina Sablofski. Two years later the family moved to Auckland where his father set up business as a stamp dealer in Shortland Street. Baden was educated at Parnell and Mt Eden schools and received his secondary education at Auckland Grammar school. In 1916 he studied fine art under Frank and Walter Wright and attended evening classes at Elam School of Art, Auckland. Between 1918-1929 he worked as a commercial artist and lithographer for Clark & Matheson and later for the "New Zealand Herald", the "Auckland Star" and the Banks Box Company. He was encouraged in his molluscan studies by the Auckland Museum botanist T.F. Cheeseman who gave him access to the collections at the Museum's old quarters in Princes Street, Auckland. He acted as Honorary Conchologist for the Auckland Institute and Museum since 1916, and in 1929 he was appointed to the staff of the Auckland Institute and Museum as conchologist and paleontologist. In 1936 he was promoted to Assistant Director of the Museum and he served in this capacity till his retirement in 1968 when he was appointed Honorary Research Associate in Mollusca.

Baden married Isabel Essie Gittos who pre-deceased him in 1976. He was married for a second time to Ida Worthy in 1978. In his private life he was a dedicated family man who enjoyed classical music, philately and watercolour painting.

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RESEARCH ACTIVITIES AND FIELD WORK

Between 1926-1937 Baden conducted a comprehensive survey of animal communities of the sea bottom of the Waitemata and Manukau Harbours and results were published in the year the survey was completed (Powell, 1937d). At about the same time he worked with Prof. J.A. Bartrum on fossil molluscs from Kaawa Creek and Oneroa, Waiheke Island. Their results were published under their joint authorship in the TNZI (Bartrum & Powell, 1928 and Powell & Bartrum, 1929). In 1932 he participated in deep-sea investigations around New Zealand in the Royal research ship "Discovery II". This resulted in the publication of Mollusca in the "Discovery Reports" (1937e). In 1952 he took part in the deep-sea investigation of the Kermadec Trench on the Danish research ship "Galathea". In 1956 he was invited to take part in the zoological research expedition "Gloria Maris" to west Irian under the auspices of the Academy of Natural Sciences of Philadelphia. He also collected widely throughout the North Island of New Zealand and also published on New Zealand molluscs in popular publications (1937f, 1947d, 1976c and 1979). Baden served on the standing committee on oceanography of the Pacific Science Association and he also was a member of the New Zealand Oceanographic Committee. In 1953 he convened the UNESCO sponsored eighth Pacific Science Congress at Manila, Philippines.

Baden's primary research interest were the New Zealand Mollusca but he also specialised in molluscs of the Antarctic and Subantarctic Islands and the families Turridae and Speightiidae and later on the Patellidae. In his Turridae project he received generous financial support from Mr Dixon Stroud, U.S.A., which enabled him to visit major Museums in Europe and the U.S.A. to study type specimens and turrid material towards his later monographs on the family. It is a matter for regret that only a small part of his extensive Turridae research has been published to date.

On moving to the new quarters of the Auckland War Memorial Museum building in the Domain, Baden Powell played an important role in the development of the displays and the housing of the Museum's shell collections. In 1930 he founded the Auckland Museum Conchology section with a membership of 7 enthusiastic schoolboys, among them the late Sir Charles Fleming. The Museum's Conchology section has a current membership of about 150.

HONOURS

His malacological research in New Zealand has been duly recognised during his lifetime. In 1940 he was elected a Fellow of the Royal Society of New Zealand, and in 1947 he received the Royal Society of New Zealand Hector memorial medal and prize for researches in Mollusca. In 1956 he was awarded an Honorary D.Sc. degree from the University of Auckland and in the New Year's honours list for 1981 he was awarded the CBE for his contributions to marine science. He was a Fellow of the Art Galleries and Museums Association of New Zealand, an Honorary Life Member of the Malacological Section of the Royal Society of South Australia, a Life Member of the Malacological Society of Australia and an Honorary Life Member of the Auckland Institute and Museum.

LISTS OF TAXA

The generic assignment is the one given originally by the author. It is beyond the scope of this paper to give detailed type localities, synonymies, generic re-assignments or holotype repositories. Full references may be found in the Bibliography section.

The following Journal abbreviations have been used:

BAIM — Bulletin of the Auckland Institute and Museum
BANZARE — British, Australian, New Zealand Antarctic Research Expedition
CEB — Cape Expedition series Bulletin
DR — Discovery Reports
IPM — Indo-Pacific Mollusca
PMSL — Proceedings of the Malacological Society of London
RAIM — Records of the Auckand Institute and Museum
RCM — Records of the Canterbury Museum
TNZI — Transactions and Proceedings of the New Zealand Institute
TRSNZ — Transactions and Proceedings of the Royal Society of New Zealand

During his malacological career Baden Powell established a total of 1,316 scientific names. In Mollusca he proposed 10 family-group names, 114 genus-group names, 1,190 species-group names, and in Crustacea 2 species-group names.

MOLLUSCAN TAXA

abbreviatus, Guraleus (Paraguraleus) Powell, 1944, RAIM 3(1):50, pl.5, fig.11. Sth. Australia, Tertiary.
achatinoides, Rissoina Powell, 1937, DR 15:202, pl.53, fig.7. N.Z., Recent.
acutangula, Hochstetteria Powell, 1935, PMSL 21(4):257, pl.28, fig.4. N.Z., Recent.
adelaidae, Splendrillia Powell, 1944, RAIM 3(1):31, pl.2, fig.6. Sth. Australia, Tertiary.
adelaidensis, Guraleus Powell, 1944, RAIM 3(1):49, pl.6, fig.13. Sth. Australia, Tertiary.
adelaidensis, Liratomina Powell, 1944, RAIM 3(1):27, pl.7, fig.5. Sth. Australia, Tertiary.
adelaidensis, ? Veprecula Powell, 1944, RAIM 3(1):61, pl.6, fig.11. Sth. Australia, Tertiary.
adenica, Lucerapex Powell, 1964, IPM 1(5):286, pl.221, fig.3. Gulf of Aden, Recent.
ADOLPHINOBA Powell, 1930, TNZI 60:537. Type species (OD) *A.finlayi* Powell, 1930. N.Z., Recent.
adpressa, Verconella Powell, 1947, RAIM 3(3):168, p.17, fig.5. N.Z., Recent.
aequisculpta, Etremopsis Powell, 1942, BAIM No.2:153, pl.9, fig.3. N.Z., Tertiary.
affinis, Nobolira Powell, 1940, TRSNZ 70:226, pl.30, fig.6. N.Z., Recent.
ahiparana, Antimelatoma Powell, 1942, BAIM No.2:98, pl.2, fig.11. N.Z., Recent.
ahiparana, Pliciscala (Nodiscala) Powell, 1930, TNZI 60:541, pl.61, fig.10. N.Z., Recent.
ahiparana, Rugobela Powell, 1927, TNZI 58:299, pl.34, figs.6,7. N.Z., Recent.
ahiparana, Turritella (Zeacolpus) Powell, 1927, TNZI 58:297, pl.34, fig.4. N.Z., Recent.
alata, Tahunanuia Powell, 1952, RAIM 4(3):170, textfigs.1,1a. N.Z., Recent.
aldermenensis, Cantharus Powell, 1971, RAIM 8:221, fig.22. N.Z., Recent.
aldingensis, Comitas (Carinacomitas) Powel, 1949, RAIM 3(1):18, pl.1, fig.7. Victoria, Australia, Tertiary.
aldingensis, Mauidrillia Powell, 1944, RAIM 3(1):36, pl.4, fig.6. Sth. Australia, Tertiary.
allani, Comitas Powell, 1942, BAIM No.2:59, pl.10, fig.6. N.Z., Tertiary.
alpha, Mysella Powell, 1937, DR 15:173, pl.46, fig.6. N.Z., Recent.

alpha, Subonoba Powell, 1955, CEB No.15:77, pl.2, fig.13. N.Z., Recent.
alta, Larochella Powell, 1927, TNZI 57:540, pl.26, fig.6. N.Z., Recent.
alta, Liarea hochstetteri Powell, 1954, RAIM 4(5):280, pl.45, figs.13,14. N.Z., Recent.
alta, Zelaxitas Powell, 1940, TRSNZ 70:224, textfig.1b.N.Z., Recent.
ALTISPECULA Powell, 1930, TNZI 60:539. Type species (OD) *Cerithiopsis geniculosus* Hedley, 1911. Sth. Australia, Recent.
ambrosia, Nucula Bartrum & Powell, 1928, TNZI 59:152, pl.29, figs. 42,43. N.Z., Tertiary.
ammonitoides, Zerotula Powell, 1940, TRSNZ 70:236, pl.29, figs.1,2. N.Z., Recent.
ampla, Austrotoma Powell, 1942, BAIM No.2:77, pl.14, fig.5. N.Z., Tertiary.
ampla, Maurea (Mucrinops) punctulata Powell, 1939, RAIM 2(4):229, pl.50, fig.6. N.Z., Recent.
ampla, Murdochia Powell, 1941, RAIM 2(5):260, pl.51, fig.10. N.Z., Recent.
analoga, Manawatawhia Powell, 1937, DR 15:199, pl.52, fig.14. N.Z., Recent.
anatokiensis, Paryphanta hochstetteri Powell, 1938, RAIM 2(3):133, pl.33, fig.7. N.Z., Recent.
angulata, Scrobs hedleyi Powell, 1927, TNZI 57:546, pl.28, fig.15. N.Z., Recent.
angulatum, Probuccinum Powell, 1951, DR 26:145, pl.7, fig.27. Sth. Georgia, Recent.
angustata, Estea Powell, 1927, TNZI 57:543, pl.27, fig.10. N.Z., Recent.
angustata, Mauidrillia Powell, 1942, BAIM No.2:87, pl.1, fig.9. N.Z., Tertiary.
angustatus, Micantapex Powell, 1940, TRSNZ 70:245, pl.31, fig.7. N.Z., Recent.
angustatus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:143, pl.8, fig.11. N.Z., Tertiary.
annectens, Acirsa Powell, 1951, DR 26:115, pl.7, fig.23. Falkland Is., Recent.
annectens, Brookula Powell, 1937, DR 15:183, pl.51, fig.14. N.Z., Recent.
annectens, Glaphyrina vulpicolor Powell, 1934, RAIM 1(5):270, pl.60, figs.28,29. N.Z., Tertiary.
annectens, Murdochia Powell, 1949, RAIM 3(4/5):274, pl.53, fig.3. N.Z., Recent.
annectens, Neilo Powell, 1931, RAIM 1(2):92, pl.12, fig.25. N.Z., Tertiary.
annectens, Paryphanta Powell, 1936, RAIM 2(1):30, pl.7, figs.4,5,7. N.Z., Recent.
annectens, Placostylus ambagiosus Powell, 1938, RAIM 2(3):148, pl.34, figs.2-6. N.Z., Recent.
annectens, Splendrillia Powell, 1942, BAIM No.2:103, pl.12, fig.5. N.Z., Tertiary.
annectens, Zemitrella Powell, 1937, DR 15:212, pl.56, fig.4. N.Z., Recent.
annosa, Maoritomella Powell, 1942, BAIM No.2:114, p.4, fig.10. N.Z., Tertiary.
anomala, Lirasyrinx Powell, 1942, BAIM No.2:69, pl.13, fig.6. N.Z., Tertiary.
anomala, Lironoba Powell, 1940, TRSNZ 70:225, pl.30, fig.3. N.Z., Recent.
anomala, Marshallena Powell, 1942, BAIM No.2:83, pl.14, fig.1. N.Z., Tertiary.
anomala, Munditia Powell, 1940, TRSNZ 70:219, pl.28, figs.16,17. N.Z., Recent.
anomala, Splendrillia Powell, 1942, BAIM No.2:103, pl.12, fig.3. N.Z., Tertiary.
anomala, Stilla Powell, 1955, CEB No.15:113, pl.1, fig.8. N.Z., Recent.
anomalapex, Pleurotomella? Powell, 1951, DR 26:173, pl.6, fig.19. Falkland Is., Recent.
anntarctica, Solariella Powell, 1958, BANZARE 6(9):183, pl.2, fig.4. Antarctica, Recent.
antarcticus, Fusitriton Powell, 1958, BANZARE 6(9):191, pl.3, fig.6. Antarctica, Recent.
anteaustralis, Proxiuber Powell, 1938, RAIM 2(3):162, textfig.3. N.Z., Tertiary.
ANTICOMITAS Powell, 1942, BAIM No.2:61. Type species (OD) *A.vivens* Powell, 1942. N.Z., Recent.
ANTIGURALEUS Powell, 1942, BAIM No.2:146. Type species (OD) *A.otagoensis* Powell, 1942. N.Z., Recent.
ANTIMARGARITA Powell, 1951, DR 26:100. Type species (OD) *Valvatella dulcis* E.A.Smith, 1907. Antarctica, Recent.
ANTIMELATOMA Powell, 1942, BAIM No.2:97. Type species (OD) *Drillia maorum* E.A.Smith, 1877. NZ., Recent.
ANTIMITRELLA Powell, 1937, DR 15:214. Type species (OD) *A.laxa* Powell, 1937. N.Z., Recent.

antipoda, Notosetia Powell, 1955, CEB No.15:86, pl.3, fig.19. N.Z., Recent.
antipodensis, Phrixgnathus (Taguahelix) Powell, 1955, CEB No.15:127, pl.4, figs.36,37. N.Z., Recent.
ANTITRICHOTROPIS Powell, 1951, DR 26:123. Type species (OD) *Trichotropis antarctica* Thiele, 1912, Antarctica, Recent.
AOTEADRILLIA Powell, 1942, BAIM No.2:87. Type species (OD) *Pleurotoma wanganuiensis* Hutton, 1873. N.Z., Tertiary.
aoteana, Hermaea Powell, 1937, RAIM 2(2):123, pl.30, fig.1. N.Z., Recent.
aoteana, Marginella (Serrata) Powell, 1932, TNZI 62:212, pl.33, fig.5. N.Z., Recent.
aoteana, Notosetia Powell, 1937, DR 15:200, pl.53, fig.11. N.Z., Recent.
aoteana, Turbonilla (Chemnitzia) Powell, 1930, TNZI 61:545, pl.87, fig.15, N.Z., Recent.
aoteanus, Mytilus Powell, 1958, RAIM 5(1):87, pl.12, fig.5. N.Z., Recent.
AOTEATILIA Powell, 1939, RAIM 2(4):235. Type species (OD) *Daphnella substriata*, Suter, 1899. N.Z., Recent.
apicina, Paramendax Powell, 1937, DR 15:206, pl.54, fig.4. N.Z., Recent.
aranea, Murdochia Powell, 1928, TNZI 59:365, pl.54, fig.1. N.Z., Recent.
arbutus, Placostylus (Basileostylus) bollonsi Powell, 1948, RAIM 3(4/5):289, pl.55, figs.6,7. N.Z., Recent.
archeyi, Succinea Powell, 1933, PMSL 20(4):192, textfigs.4,5. N.Z., Recent.
archibenthalis, Leucosyrinx Powell, 1969, IPM 2(10):344, pl.264, fig.6,7. Philippines, Recent.
ardgowanica, Ovaleda Powell, 1935, PMSL 21(4):253, pl.27, figs.3,4. N.Z., Tertiary.
armata, Splendrillia Powell, 1942, BAIM No.,2:103, pl.12, fig.2. N.Z., Tertiary.
armata, Zemacies Powell, 1942, BAIM No.2:66, pl.4, fig.6. N.Z., Tertiary.
arthritica, Charonia (Charoniella) Powell & Bartrum, 1929, TNZI 60:427, pl.34, figs.1,2. N.Z., Tertiary.
arthritica, Struthiolaria Bartrum & Powell, 1928, TNZI 59:142, pl.30, figs.55,56. N.Z., Tertiary.
asperrimoides, Chlamys (Mimachlamys) Powell, 1958, RAIM 5(1/2):70, pl.11, figs.3,4. Norfolk I, Recent.
ASPERTILLA Powell, 1944, RAIM 3(1):60. Type species (OD) *Drillia legrandi* Beddome, 1883. Tasmania, Australia, Tertiary.
asperula, Xymenella Powell & Bartrum, 1929, TNZI 60:437, pl.46, figs.85,86. N.Z., Tertiary.
asteleformis, Gyriscus Powell, 1965, RAIM 6(2):161, pl.22, fig.11. N.Z., Recent.
atomaria, Notosetia Powell, 1933, RAIM 1(4):198, pl.34, fig.9. N.Z., Recent.
attenuata, Aeneator Powell, 1927, TNZI 58:298, pl.34, fig.5. N.Z., Recent.
attenuata, Zemitrella Powell, 1940, TRSNZ 70:240, pl.32, fig.4. N.Z. Recent.
attenuatispira, Mendax Powell, 1937, DR 15:205, pl.54, fig.5. N.Z., Recent.
atypica, Conjectura Powell, 1937, DR 15:187, pl.51, figs.10,11. N.Z., Recent.
aucklandica, Chione (Austrovenus) Powell, 1932, PMSL 20(1):68, pl.6, figs.3,4. N.Z., Recent.
aucklandica, Glycymeris (Grandaxinea) Powell, 1938, TRSNZ 68:364, pl.38, fig.9. N.Z. Tertiary.
aucklandica, Legrandina Powell, 1933, PMSL 20(5):233, textfig.1. N.Z., Recent.
aucklandica, Leptomya retiaria Powell, 1955, CEB No.15:38, pl.1, fig.2. N.Z., Recent.
aucklandica, Macquariella Powell, 1933, PMSL 20(5):233, pl.20, fig.6. N.Z., Recent.
aucklandica, Parapholas Powell, 1938, TRSNZ 68:368, pl.38, figs.5,6. N.Z., Tertiary.
AUPOURIA Powell, 1937, DR 15:164. Type species (OD) *A.parvula* Powell, 1937. N.Z., Recent.
aupouria, Balcis Powell, 1937, DR 15:211, pl.54, fig.10. N.Z., Recent.
aupouria, Buccinulum (Evarnula) multilineum Powell, 1940, TRSNZ 70:238, pl.33, fig.16. N.Z., Recent.
aupouria, Cuna Powell, 1937, DR 15:169, pl.46, figs.1,2. N.Z., Recent.
aupouria, Cyclopecten (Cyclochlamys) Powell, 1937, DR 15:167, pl.47, figs.1.2. N.Z., Recent.
aupouria, Eulimella Powell, 1937, DR 15:210, pl.54, fig.9. N.Z., Recent.
aupouria, Fossarus Powell, 1937, DR 15:189, pl.49, fig.12. N.Z., Recent.

aupouria, Haurakia Powell, 1937, DR 15:191, pl.52, fig.4. N.Z., Recent.
aupouria, Kidderia Powell, 1933, PMSL 20(4):204, pl.18, fig.5. N.Z., Recent.
aupouria, Liarea aupouria Powell, 1954, RAIM 4(5):286, pl.44, fig.2; pl.48, figs.33,33a. N.Z., Recent.
aupouria, Limatula Powell, 1937, DR 15:168, pl.47, fig.4. N.Z., Recent.
aupouria, Liotella Powell, 1937, DR 15:182, pl.51, fig.9. N.Z., Recent.
aupouria, Lissotesta Powell, 1937, DR 15:186, pl.51, fig.7. N.Z., Recent.
aupouria, Marginella (Glabella) Powell, 1937, DR 15:215, pl.55, fig.5. N.Z., Recent.
aupouria, Munditia Powell, 1937, DR 15:181, pl.50, figs.3,4. N.Z., Recent.
aupouria, Mysella Powell, 1937, DR 15:172, pl.47, fig.5. N.Z., Recent.
aupouria, Notoplax Powell, 1937, DR 15:220, pl.48, fig.1. N.Z., Recent.
aupouria, Notosetia Powell, 1937, DR 15:201, pl.53, fig.12. N.Z., Recent.
aupouria, Notosinister Powell, 1937, DR 15:206, pl.54, fig.2. N.Z., Recent.
aupouria, Retusa Powell, 1937, DR 15:219, pl.55, fig.7. N.Z., Recent.
aupouria, Rissoina Powell, 1937, DR 15:201, pl.53, fig.6. N.Z., Recent.
aupouria, Schizotrochus Powell, 1937, DR 15:176, pl.49, fig.3. N.Z., Recent.
aupouria, Subonoba Powell, 1940, TRSNZ 70:225, pl.30, fig.8. N.Z. Recent.
aupouria, Zeadmete Powell, 1940, TRSNZ 70:243, pl.29, fig.13. N.Z., Recent.
aurantia, Iredalina Powell, 1954. RAIM 4(4):239, pl.39, fig.4. N.Z., Recent.
aurea, Paryphanta gilliesi Powell, 1946, RAIM 3(2):113, pl.10, figs. 7,8. N.Z., Recent.
aureola, Socienna Powell, 1933, RCM 4:38, pl.6, fig.5. N.Z., Recent.
AUSTROCLAVUS Powell, 1942, BAIM No.2:118. Type species (OD) *Drillia tenuispiralis* Marshall, 1918. N.Z., Tertiary.
AUSTRONEAERA Powell, 1937, DR 15:174. Type species (OD) *A.brevirostris* Powell, 1937. N.Z., Recent.
AUSTRONOBA Powell, 1927, TNZI 57:541. Type species (OD) *A.candidissima* Webster, 1905, N.Z., Recent.
AUSTRONUCULA Powell, 1939, RAIM 2(4):220. Type species (OD) *A.schencki* Powell, 1939. N.Z., Recent.
austrotomoides, Marshallena Powell, 1931, RAIM 1(2):106, pl.10, figs.5,6. N.Z., Tertiary.
awakinoensis, Austroclavus Powell, 1942, BAIM No.2:120, pl.1, fig.4. N.Z., Tertiary.
awakinoensis, Eubela Powell, 1942, BAIM No.2:165, pl.10, fig.2. N.Z., Tertiary.
awakinoensis, Zemacies Powell, 1942, BAIM No.2:67, pl.14, fig.4. N.Z., Tertiary.
AWANUIA Powell, 1927, TNZI 57:538. Type species (OD) *A.dilatata* Powell, 1927. N.Z., Recent.
balcombensis, Apiotoma Powell, 1944, RAIM 3(1):20, pl.7, fig.10. Victoria, Australia, Tertiary.
balcombensis, Asperdaphne Powell, 1944, RAIM 3(1):59, pl.6, fig.7. Victoria, Australia, Tertiary.
balcombensis, Guraleus (Paraguraleus) Powell, 1944, RAIM 3(1):50, pl.5, fig.13. Victoria, Australia, Tertiary.
balcombensis, Maoritomella Powell, 1944, RAIM 3(1):39, pl.4, fig.12. Victoria, Australia. Tertiary.
balcombensis, Teleochilus Powell, 1944, RAIM 3(1):65, pl.6, fig.1. Victoria, Australia, Tertiary.
BANZARECOLPUS Powell, 1957, BANZARE 6(7):130. Type species (OD) *Turritella austrina* Watson, 1881. Kurguelen Is, Recent.
barkeri, Zeadmete Powell, 1952, RAIM 4(3):184, pl.36, fig.1. N.Z., Recent.
barrierensis, Mitrithara Powell, 1942, BAIM No.2:124, pl.11, fig.2. N.Z., Recent.
barrierensis, Schizoglossa novoseelandica Powell, 1949, RAIM 3(6):367, pl.65, fig.14. N.Z., Recent.
bartrumi, Mayena Powell, 1938, TRSNZ 68:372, pl.39, fig.12. N.Z., Tertiary.
bartrumi, Thyasira (Prothyasira) Powell, 1935, RAIM 1(6):332, pl.76, figs.5,6. N.Z., Tertiary.

BELALORA Powell, 1951, DR 26:171. Type species (OD) *B.thielei* Powell, 1951. Falkland Is, Recent.

BELATOMINA Powell, 1942, BAIM No.2:72. Type species (OD) *Bela pulchra* Tate, 1888. Victoria, Australia, Tertiary.

BELATURRICULA Powell, 1951, DR 26:170. Type species (OD) *Bela turrita* Strebel, 1908. Sth. Georgia, Recent.

bella, Tromina Powell, 1951, DR 26:136, pl.6, fig.16. Falkland Is, Recent.

benesulcata, Zefallacia Powell & Bartrum, 1929, TNZI 60:416, pl.37, figs.27-31. N.Z., Tertiary.

benthicola, Antimelatoma Powell, 1942, BAIM No.2:98, pl.2, fig.10. N.Z., Recent.

benthicola, Herpetopoma Powell, 1937, DR 15:178, pl.49, fig.13, N.Z., Recent.

benthicola, Lissotesta Powell, 1927, RCM 3(2):115, pl.21, fig.7. N.Z., Recent.

benthicola, Neoguraleus Powell, 1942, BAIM No.2:136, pl.6, fig.3. N.Z., Recent.

benthicola, Notosetia Powell, 1927, RCM 3(2):117, pl.21, fig.1. N.Z., Recent.

benthicola, Pleuromeris latiuscula Powell, 1937, DR 15:171, pl.45, fig.6. N.Z., Recent.

benthicola, Zalipais Powell, 1927, RCM 3(2):115, pl.21, fig.12. N.Z., Recent.

benthicola, Zeminolia Powell, 1937, DR 15:180, pl.51, fig..4. N.Z., Recent.

BENTHOCARDIELLA Powell, 1939, TNZI 60:533. Type species (OD) *B.pusilla* Powell, 1930. N.Z., Recent.

bernardi, Pachykellya Powell, 1927, RCM 3(2):121, pl.23, fig.3. N.Z., Recent.

beta, Mysella Powell, 1937, DR 15:173, pl.46, fig.7. N.Z., Recent.

beta, Subonoba Powell, 1955, CEB No.15:77, pl.2, fig.14. N.Z., Recent.

beuteli, Cochlespira Powell, 1969, IPM 2(10):404, pl.316. Australia, Recent.

biangulata, Tropidomarga Powell, 1951, DR 26:101, pl.5, fig.5. Sth. Georgia, Recent.

bibaphus, Trochus Bartrum & Powell, 1928, TNZI 59:140, pl.27, figs.21,22. N.Z., Tertiary.

bicarinata, Lissotesta Powell, 1940, TRSNZ 70:222, pl.28, fig.12. N.Z., Recent.

bicolor, Paryphanta hochstetteri Powell, 1930, RAIM 1(1):40, pl.2, figs.3,4. N.Z., Recent.

biconvexa, Myodora Powell, 1927, RCM 3(2):123, pl.23, fig.9. N.Z., Recent.

bioconvexa, Scalpomactra Powell & Bartrum, 1929, TNZI 60:405, pl.50, fig.108. N.Z., Tertiary.

bidentifera, Mysella Powell, 1933, PMSL 20(4):205, pl.18, fig.6. N.Z., Recent.

bisculptus, Xenuroturris (Veruturris) Powell, 1944, RAIM 3(1):11, pl.1, fig.4. Victoria, Australia, Tertiary.

bisecta, Aoteadrillia Powell, 1942, BAIM No.2:92, pl.1, fig,6. N.Z., Tertiary.

blacki, Mayena australasia Powell, 1954, RAIM 4(4):237, pl.39, fig.2. N.Z., Recent.

blacki, Phrixgnathus Powell, 1951, RAIM 4(2):133, pl.27, fig.5. N.Z., Recent.

blacki, Venustas Powell, 1950, RAIM 4(1):80, pl.7, figs.3,4. N.Z., Recent.

bollonsi, Balcis Powell, 1937, DR 15:211, pl.54, figs.11,12. N.Z., Recent.

bollonsi, Cellana strigilis Powell, 1955, CEB No.15:73, pl.5, figs. 48-50. N.Z., Recent.

bollonsi, Dardanula Powell, 1955, CEB No.15:88, pl.3, fig.25. N.Z., Recent.

bollonsi, Nobolira Powell, 1930, TNZI 60:536, pl.60, fig.7, N.Z., Recent.

bollonsi, Pronucula Powell, 1955, CEB No.15:19, pl.1, fig.3. N.Z., Recent.

bollonsi, Tawera Powell, 1932, PMSL 20(1):68, pl.6, figs.5,6. N.Z., Recent.

bountyensis, Actinoleuca campbelli Powell, 1955, CEB No.15:65, p.1, fig.9. N.Z., Recent.

bountyensis Benthocardiella obliquata Powell, 1933, RCM 4:33, textfig. 1. N.Z., Recent.

bountyensis, Euthrenopsis Powell, 1929, TNZI 60:90, pl.3, fig.58. N.Z., Recent.

bountyensis, Hypermastus Powell, 1933, PMSL 20(5):235, pl.20, fig.5. N.Z., Recent.

bountyensis, Scissurella Powell, 1933, RCM 4:34, pl.6, figs.1,2. N.Z., Recent.

bountyensis, Striatestea Powell, 1927, TNZI 57:544, pl.28, fig.18. N.Z., Recent.

bouvetia, Margarella Powell, 1951, DR 26:97, pl.5, fig.3. Bouvet I, Recent.

brambleyae, Semele Powell, 1967, RAIM 6(3):196, pl.37, figs.7-9. N.Z., Recent.

brevicaudalis, Austroclavus Powell, 1944, RAIM 3(1):40, pl.2, fig.2. Victoria, Australia, Tertiary.

brevirostris, Austroneaera Powell, 1937, DR 15:174, pl.48, fig.11. N.Z., Recent.

brookesi, Cominella virgata Powell, 1952, RAIM 4(3):181, pl.35, fig.7. N.Z., Recent.

brunnea, Paryphanta gilliesi Powell, 1938, RAIM 2(3):138, pl.33, fig.14. N.Z., Recent.
brunneacincta, Austromitra Powell, 1952, RAIM 4(3):183, pl.36, fig.4. N.Z., Recent.
bruuni, Conus (Dauciconus) Powell, 1958, RAIM 5(1/2):84, pl.10, fig.3. Kermadec Is, Recent.
bruuni, Lutraria Powell, 1967, RAIM 6(3):198, pl.38, figs.1,2. Kermadec Is, Recent.
bruuni, Oniscidia Powell, 1958, RAIM 5(1/2):80, pl.11, fig.5. Kermadec Is, Recent.
bucknilli, Buccinulum (Euthrena) heteromorphum Powell, 1929, TNZI 60:86, pl.2, figs.51,52. N.Z., Recent.
bucknilli, Epitonium Powell, 1924, TNZI 55:138, pl.5. N.Z., Recent.
buddlei, Paralaoma Powell, 1951, RAIM 4(2):133, pl.27, figs.1,2. N.Z., Recent.
buddlei, Rhytida (Rhytidarex) Powell, 1948, RAIM 3(4/5):282, pl.55, figs.8,9. N.Z., Recent.
caelata, Joculator Powell, 1930, TNZI 60:540, pl.62, fig.19. N.Z., Recent.
caelata, Lissotesta Powell, 1937, DR 15:185, pl.51, fig.5. N.Z., Recent.
caelatum, Buccinulum (Evarnula) Powell, 1929, TNZI 60:76, pl.2, fig.30. N.Z., Tertiary.
caelatus, Pseudexomilus Powell, 1944, RAIM 3(1):62, pl.6, fig.12. Sth. Australia, Tertiary.
calva, Alcithoe Powell, 1928, TNZI 59:362, pl.53, figs.5,6. N.Z., Recent.
campbellica, Sundaya Powell, 1955, CEB No.15:92, pl.2, fig.18. N.Z., Recent.
cannoni, Cantharidus opalus Powell, 1933, RAIM 1(4):194, pl.36, figs.15,16. N.Z., Recent.
caperatus, Placostylus (Basileostylus) bollonsi Powell, 1948, RAIM 3(4/5):289, pl.55, figs.4,5. N.Z., Recent.
CARINACOMITAS Powell, 1942, BAIM No.2:60. Type species (OD) *Pleurotoma clarae* Tenison-Woods, 1880. Victoria, Australia, Tertiary.
carinapex, Etremopsis Powell, 1942, BAIM No.2:153, pl.9, fig.6. N.Z., Tertiary.
carinata, Conjectura Powell, 1940, TRSNZ 70:223, pl.28, fig.8. N.Z., Recent.
carinata, Ellicea Powell, 1929, TNZI 60:90, pl.4, figs.73,74. N.Z., Tertiary.
carinata, Marshallena Powell, 1935, RAIM 1(6):336, pl.78, figs.26,27. N.Z., Tertiary.
carnleyensis, Monodilepas Powell, 1955, CEB No.15:48, pl.5, fig.43, textfig.A1. N.Z., Recent.
castanella, Xenuroturris Powell, 1964, IPM 1(5):324, col.pl.175, figs.21,22. Hawaiian Is, Recent.
caudatum, Buccinulum (Evarnula) Powell, 1929, TNZI 60:75, pl.2, fig.50. N.Z., Tertiary.
CAVINEPTUNEA Powell, 1951, DR 26:145. Type species (OD) *C.monstrosa* Powell, 1951. Sth.Georgia, Recent.
cerithiformis, Xenuroturris (ex-Tinker MS), Powell, 1964, IPM 1(5):324, pl.175, figs.14,15. Hawaiian Is, Recent.
cerussata, Cuna Bartrum & Powell, 1928, TNZI 59:154, pl.29, figs.46,47. N.Z., Tertiary.
chapplei, Apiotoma Powell, 1944, RAIM 3(1):21, pl.3, fig.6. Victoria, Australia, Tertiary.
chapplei, Daphnella Powell, 1944, RAIM 3(1):59, pl.6, fig.6. Victoria, Australia, Tertiary.
chapplei, Guraleus Powell, 1944, RAIM 3(1):47, pl.4, fig.1. Sth. Australia, Tertiary.
CHARONIELLA Powell & Bartrum, 1929, TNZI 60:426. Type species (OD) *Charonia arthritica* Powell & Bartrum, 1929. N.Z., Tertiary. [non Thiele, 1929] (see nom.subst. **Proxicharonia** Powell, 1938).
CHARONIINAE Powell, 1933, TNZI 63:155. Type genus **CHARONIA** Gistel, 1848 [not indicated as a new subfamily].
chathamensis, Austrosipho (Verconella) Powell, 1938, RAIM 2(3):167, pl.40, fig.7, N.Z., Recent.
chathamensis, Benthocardiella obliquata Powell, 1933, RAIM 1(4):190, pl.34, fig.2. N.Z., Recent.
chathamensis, Condylocardia pectinata Powell, 1933, RAIM 1(4):189, pl.33, fig.8. N.Z., Recent.
CHLANIFICULA Powell, 1958, BANZARE 6(7):193. Type species (OD) *C.thielei* Powell, 1958. Antarctica, Recent.
CINGULITURRIS Powell, 1964, IPM 1(5):319. Type species (OD) *Asthenotoma tatei* Cossmann, 1896. Victoria, Australia, Tertiary.
circinata, Syntomodrillia Powell, 1944, RAIM 3(1):33, pl.2, fig.12. Victoria, Australia, Tertiary.

clarki, Wainuia Powell, 1936, RAIM 2(1):36, pl.9, figs.4,5. N.Z., Recent.
clathrata, Belatomina Powell, 1944, RAIM 3(1):25, pl.7, fig.9. Victoria, Australia, Tertiary.
clava, Splendrillia Powell, 1942, BAIM No.2:101, pl.12, fig.6. N.Z., Tertiary.
CLAVATOMA Powell, 1942, BAIM No.2:106. Type species (OD) *C.pulchra* Powell, 1942, N.Z., Tertiary.
clavicula, Mauidrillia Powell, 1942, BAIM No.2:86, pl.1, fig.12. N.Z., Tertiary.
CLAVINAE Powell, 1942, BAIM No.22:32. Type genus **CLAVUS** Montfort, 1810. Subfamily name anticipated by Casey, 1904 [non McCrady, 1859].
clifdenensis, Austroclavus Powell, 1942, BAIM No.2:119, pl.1, fig.1. N.Z., Tertiary.
clifdenensis, Gemmula Powell, 1942, BAIM No.2:49, pl.13, fig.14. N.Z., Tertiary.
clifdenensis, Ledella Powell, 1935, PMSL 21(4):254, pl.27, fig.7. N.Z., Tertiary.
clifdenensis, Splendrillia Powell, 1942, BAIM No.2:101, pl.2, fig.2. N.Z., Tertiary.
clifdenensis, Vexiguraleus Powell, 1942, BAIM No.2:145, pl.5, fig.2. N.Z., Tertiary.
clifdenica, Anacithara Powell, 1942, BAIM No.2:155, pl.5, fig.8. N.Z., Tertiary.
clifdenica, Austrotoma Powell, 1942, BAIM No.2:74, pl.3, fig.4. N.Z., Tertiary.
clifdenica, Etremopsis Powell, 1942, BAIM No.2:152, pl.9, fig.9. N.Z., Tertiary.
clifdenica, Tomopleura Powell, 1942, BAIM No.2:112, pl.12, fig.9. N.Z., Tertiary.
cochlearella, Nobolira Powell, 1937, DR 15:195, pl.52, fig.15. N.Z., Recent.
cochleata, Merelina Powell, 1937, DR 15:194, pl.52, fig.7. N.Z., Recent.
cochleatus, Xenuroturris (Veruturris) Powell, 1944, RAIM 3(1):10, pl.7, fig.11. Victoria, Australia, Tertiary.
COCHLESPIRINAE Powell, 1942, BAIM No.2:30. Type genus **COCHLESPIRA** Conrad, 1865 [not indicated as a new subfamily].
COLPOSPIRELLA Powell, 1951, DR 26:113. Type species (OD) *Turritella algida* Melvill & Standen, 1912. Falkland Is, Recent.
COMINELLIDAE Powell, 1929, TNZI 60:59. Type genus **COMINELLA** H. & A. Adams, 1853. Family group name anticipated by Gray, 1857.
compacta, Merelina Powell, 1927, TNZI 57:537, pl.26, figs.5,5A. N.Z., Recent.
complexa, Syntomodrillia Powell, 1944, RAIM 3(1):33, pl.2, fig.8. Victoria, Australia, Tertiary.
compressidens, Cuna Powell, 1933, PMSL 20(4):194, pl.16, fig.1. N.Z., Recent.
compta, Etremopsis Powell, 1942, BAIM No.2:152, pl.9, fig.10. N.Z., Tertiary.
compta, Liratila Powell, 1930, TNZI 60:542, pl.61, fig.9. N.Z., Recent.
compta, Paryphanta Powell, 1930, RAIM 1(1):48, pl.6, figs.4,5. N.Z., Recent.
compta, Syntomodrillia Powell, 1944, RAIM 3(1):33, pl.2, fig.9. Victoria, Australia, Tertiary.
comptus, Teleochilus Powell, 1944, RAIM 3(1):66, pl.6, fig.3. Victoria, Australia, Tertiary.
concentrica, Pachykellya Powell, 1927, RCM 3(2):121, p.23, fig.2. N.Z., Recent.
conoidea, Lissotesta Powell, 1937, DR 15:186, pl.51, fig.6. N.Z., Recent.
CONORBELA Powell, 1951, DR 26:170. Type species (OD) *Bela antarctica* Strebel, 1908, Antarctica, Recent.
CONORBIINAE Powell, 1942, BAIM No.2:32. Type genus **CONORBIS** Swainson, 1840. Family-group name anticipated by de Gregorio, 1890.
consobrina, Admete Powell, 1951, DR 26:167, pl.10, fig.63. Sth.Georgia, Recent.
consobrina, Cirsonella Powell, 1930, TNZI 60:534, pl.61, figs.13,14. N.Z., Recent.
consobrina, Cominella (Eucominia) ellisoni Powell, 1933, RAIM 1(4):206, pl.36, fig.8. N.Z., Subrecent.
consobrina, Lissotesta Powell, 1940, TRSNZ 70:221, pl.28, fig.11. N.Z., Recent.
consobrina, Paryphanta hochstetteri Powell, 1936, RAIM 2(1):29, pl.7, fig.3. N.Z., Recent.
consobrina, Turridrupa astricta Powell, 1967, IPM 1(7):418, pl.305, fig.3. Hawaiian Is, Recent.
consobrinus, Fautor Powell, 1958, RAIM 5(1/2):78, pl.9, fig.2. Kermadec Is, Recent.
consobrinus, Placostylus ambagiosus Powell, 1938, RAIM 2(3):149, pl.34, figs.7,8. N.Z., Recent.
consobrinus, Pyrazus Powell & Bartrum, 1929, TNZI 60:417, pl.37, figs.32,33. N.Z., Tertiary.

constans, Zemitrella Powell, 1955, CEB No.15:107, pl.1, fig.7. N.Z., Recent.
contigua, Asperdaphne Powell, 1944, RAIM 3(1):60, pl.6, fig.8. Victoria, Australia, Tertiary.
contigua, Brookula Powell, 1940, TRSNZ 70:222, pl.29, fig.8. N.Z., Recent.
contigua, Etremopsis Powell, 1944, RAIM 3(1):55, pl.5, fig.6. Sth. Australia, Tertiary.
contigua, Nobolira Powell, 1940, TRSNZ 70:226, pl.30, fig.5. N.Z., Recent.
contigua, Subonoba Powell, 1958, BANZARE 6(9):184, pl.1, fig.8. Antarctica, Recent.
contigua, Zemitrella Powell, 1934, RAIM 1(5):274, pl.59, figs.21,22. N.Z., Tertiary.
convexispira, Dardanula Powell, 1955, CEB No.15:89, pl.3, fig.22. N.Z., Recent.
cookiana, Thoristella chathamensis Powell, 1934, TRSNZ 64:154, pl.22, figs.10,11. N.Z., Recent.
cooperi, Scutellastra Powell, 1938, TRSNZ 68:379, pl.39, figs.13,14. N.Z., Tertiary.
cophina, Cellana Powell, 1973, IPM 3(15):190, pl.172, fig.1. N.Z., Recent.
cornea, Discotrichoconcha Powell, 1951, DR 26:125, pl.7, fig.21. Antarctica, Recent.
CORNEOLITORINA Powell, 1951, DR 26:108. Type species (OD) *Laevilitorina coriacea* Melvill & Standen. Sth. Orkneys, Recent.
CORONASYRINX Powell, 1944, RAIM 3(1):22. Type species (OD) *C.venusta* Powell, 1944. Victoria, Australia, Tertiary.
coronata, Promerelina Powell, 1926, TNZI 56:594, fig.1. N.Z., Recent.
costata, Scalaronoba Powell, 1927, RCM 3(2):116, pl.21, fig.9. N.Z., Recent.
crassatinum, Buccinulum (Evarnula) Powell, 1929, TNZI 60:73, pl.3, figs. 61,62. N.Z., Tertiary.
crassicarinata, Estea Powell, 1937, DR 15:196, pl.53, fig.4. N.Z., Recent.
crassiconus, Scrobs Powell, 1933, PMSL 20(4):196, pl.16, fig.4. N.Z., Recent.
crassicordata, Estea Powell, 1937, DR 15:197, pl.53, fig.17. N.Z., Recent.
crassicosta, Haurakia Powell, 1955, CEB No.15:80, pl.3, fig.27. N.Z., Recent.
crassicosta, Thoristella Powell, 1937, DR 15:178, pl.49, figs.14,15. N.Z., Recent.
crassiformis, Arthritica Powell, 1933, PMSL 20(4):195, pl.16, figs. 2,3. N.Z., Recent.
crassilabrum, Notosetia Powell, 1940, TRSNZ 70:228, pl.30, fig.12. N.Z., Recent.
crassissima, Merelina Powell, 1937, DR 15:194, pl.52, fig.9. N.Z., Recent.
crawfordi, Syrnola Powell, 1927, TNZI 58:297, pl.34, fig.2. N.Z., Recent.
crenulata, Zerotula Powell, 1937, DR 15:209, pl.54, figs.6,7. N.Z., Recent.
crispulatus, Merelina Powell, 1937, DR 15:194, pl.52, fig.7. N.Z., Recent.
cristata, Splendrillia Powell, 1942, BAIM No.2:102, pl.12, fig.4. N.Z., Tertiary.
crosseaformis, Promerelina Powell, 1926, TNZI 56:593, fig.2. N.Z., Recent.
CRYPTOBORSONIA Powell, 1944, RAIM 3(1):43. Type species (OD) *C.pleuromella* Powell, 1944. Victoria, Australia, Tertiary.
cryptoconoidea, Austrotoma Powell, 1942, BAIM No.2:75, pl.3, fig.6. N.Z., Tertiary.
CRYPTODAPHNE Powell, 1942, BAIM No.2:164. Type species (OD) *C.pseudodrillia* Powell, 1942. N.Z., Tertiary.
cryptus, Micrelenchus oliveri Powell, 1946, RAIM 3(2):139, pl.11, fig.7. N.Z., Recent.
cumberi, Helicarion (Peloparion) Powell, 1941, RAIM 2(5):262, pl.51, figs.6-8. N.Z., Recent.
cuneata, Parvithracia Powell, 1937, DR 15:174, pl.46, fig.9. N.Z., Recent.
cuneata, Puyseguria Powell, 1927, RCM 3(2):122, pl.23, fig.5. N.Z., Recent.
curvirostris, Zemitrella Powell, 1937, DR 15:213, pl.56, fig.6. N.Z., Recent.
cuspidarioides, Trophon Powell, 1951, DR 26:155, pl.9, fig.50. Sth. Georgia, Recent.
cuvieriana, Verconella dilatata Powell, 1927, TNZI 57:553, pl.29, figs.13,14. N.Z., Recent.
dampierana, Gemmula Powell, 1964, IPM 1(5):248, pl.186, fig.5. N.W. Australia, Recent.
daphnelloides, Prosipho Powell, 1958, BANZARE 6(9):196, pl.1, fig.9. Antarctica, Recent.
dawbini, Potamopyrgus Powell, 1955, CEB No.15:90, pl.3, fig.28. N.Z., Recent.
decapitata, Rochefortula Powell, 1939, RAIM 2(4):226, pl.48, fig.4. N.Z., Recent.
deceptus, Antiguraleus Powell, 1942, BAIM No.2:146, pl.8, fig.7. N.Z., Tertiary.
deceptus, Neoguraleus Powell, 1942, BAIM No.2:133, pl.9, fig.12. N.Z., Tertiary.
decipiens, Lissotesta Powell, 1940, TRSNZ 70:221, pl.28, fig.3. N.Z., Recent.
declivis, Comitas Powell, 1931, RAIM 1(2):107, pl.14, fig.41. N.Z., Tertiary.

decoratum, Buccinulum (Evarnula) sufflatum Powell, 1929, TNZI 60:77, pl.1, figs.6,7. N.Z., Recent.
defossa, Awateria Powell, 1942, BAIM No.2:129, pl.11, fig.7. N.Z., Tertiary.
delicatula, Aeneator Powell, 1929, TNZI 60:91, pl.4, fig.75. N.Z., Tertiary.
delicatula, Cratis Powell, 1937, DR 15:166, pl.45, fig.3. N.Z., Recent.
delicatula, Munditia Powell, 1940, TRSNZ 70:219, pl.28, figs.1,2. N.Z., Recent.
delicatula, Stilla Powell, 1927, RCM 3(2):119, pl.21, fig.11. N.Z., Recent.
delicatula, Subonoba Powell, 1933, PMSL 20(5):235, fig.3. N.Z., Recent.
delicatulum, Probuccinum Powell, 1951, DR 26:144, pl.7, fig.28. Sth. Georgia, Recent.
delicatulus, Phrixgnathus (Taguahelix) Powell, 1955, CEB No.15:127, pl.4, figs.33-35. N.Z., Recent.
delicatulus, Pseudoinquisitor Powell, 1944, RAIM 3(1):29, pl.3, fig.4. Victoria, Australia, Tertiary.
delli, Macquariella Powell, 1955, CEB No.,15:75, pl.1, fig.10. N.Z., Recent.
delli, Penion benthicola Powell, 1971, RAIM 8:222, fig.24. N.Z., Recent.
delta, Subonoba Powell, 1955, CEB No.15:78, pl.2, fig.12, N.Z., Recent.
denseliratus, Teleochilus Powell, 1944, RAIM 3(1):64, pl.3, fig.10. Victoria, Australia, Tertiary.
diffusa, Turridrupa Powell, 1967, IPM 1(7):422, pl.305, fig.5. Samoa Is, Recent.
dilatata, Awanuia Powell, 1927, TNZI 57:539, pl.26, fig.3. N.Z., Recent.
dilatata, Notosetia Powell, 1955, CEB No.15:86, pl.3, fig.21. N.Z., Recent.
diomedea, Comitas thisbe Powell, 1969, IPM 2(10):277, pl.225, figs.3,4. Indonesia, Recent.
diomedea, Gemmula congener Powell, 1964, IPM 1(5):253, pl.191, figs.5,6. Philippines, Recent.
diomedea, Marshallena Powell, 1969, IPM 2(10):368, pl.277, figs.5,6. Indonesia, Recent.
discors, Micantapex Powell, 1942, BAIM No.2:54, pl.13, fig.5. N.Z., Tertiary.
DISCOTRICHOCONCHA Powell, 1951, DR 26:125. Type species (OD) *D.cornea* Powell, 1951. Antarctica, Recent.
Dispar, Cosa serratocostata Powell, 1937, DR 15:165, pl.45, fig.7. N.Z., Recent.
dispar, Verconella Powell, 1947, RAIM 3(3):165, pl.18, fig.3. N.Z., Recent.
dissimilis, Egestas Powell, 1937, DR 15:211, pl.55, fig.8. N.Z., Recent.
DIVARILIMA Powell, 1958, RAIM 5(1/2):72. Type species (OD) *Lima sydneyensis* Hedley, 1904. Australia, Recent.
DIVARISCINTILLA Powell, 1932, PMSL 22(1):66. Type species (OD) *D.maoria* Powell, 1932. N.Z., Recent.
donaciformis, Semeloidea Bartrum & Powell, 1928, TNZI 59:158, pl.29, figs.49,50. N.Z., Tertiary.
duplicarinata, Mendax Powell, 1940, TRSNZ 70:232, pl.29, fig.4. N.Z., Recent.
duplicarinata, Proneptunea Powell, 1951, DR 26:150, pl.6, fig.13. Sth. Georgia, Recent.
dulpicata, Haurakia Powell, 1937, DR 15:191, pl.52, fig.2. N.Z., Recent.
duplicatum, Scrinium Powell, 1944, RAIM 3(1):45, pl.1, fig.8. Victoria, Australia, Tertiary.
duplicatus, Teleochilus Powell, 1944, RAIM 3(1):65, pl.6, fig.2. Victoria, Australia, Tertiary.
ealesae, Marginella Powell, 1958, BANZARE 6(9):200, textfig.B1. Antarctica, Recent.
echinata, Austrotoma Powell, 1942, BAIM No.2:74, pl.3, fig.5. N.Z., Tertiary.
echinata, Awateria Powell, 1942, BAIM No.2:130, pl.11, fig.2. N.Z., Tertiary.
echinata, Munditia Powell, 1937, DR 15:181, pl.50, figs.5,6. N.Z., Recent.
echinolamellatus, Trophon Powell, 1951, DR 26:152, pl.9, figs.44,45. Antarctica, Recent.
echinophorus, Murexsul Powell & Bartrum, 1929, TNZI 60:435, pl.47, figs.91,92. N.Z., Tertiary.
ECHINOTURRIS Powell, 1942, BAIM No.2:50. Type species (OD) *"Turris" finlayi* Powell, 1935. N.Z., Tertiary.
edgari, Patinigera fuegiensis Powell, 1957, BANZARE 6(7):127, pl.2, fig.5, textfig.B. Kerguelen Is, Recent.
edita, Austrosipho (Verconella) Powell, 1934, RAIM 1(5):271, pl.60, figs.24,25. N.Z., Tertiary.

edita, Splendrillia Powell, 1942, BAIM No.2:103, pl.2, fig.3. N.Z., Tertiary.
edita, Subonoba Powell, 1939, RAIM 2(4):231, pl.49, fig.6. N.Z., Recent.
editum, Zebittium Powell, 1930, TNZI 60:541, pl.61, fig.15. N.Z., Recent.
editus, Optoturris Powell, 1944, RAIM 3(1):12, pl.7, fig.3. Victoria, Australia, Tertiary.
elata, Etremopsis Powell, 1942, BAIM No.2:153, pl.9, fig.8. N.Z., Tertiary.
elegantula, Altispecula Powell, 1930, TNZI 60:539, pl.61, figs.11,12. N.Z., Recent.
elegantula, Insolentia Powell, 1942, BAIM No.2:64, pl.10, fig.7. N.Z., Tertiary.
elegantula, Liratilia Powell, 1937, DR 15:215, pl.56, fig.1, N.Z., Recent.
elongata, Scrobs Powell, 1927, TNZI 57:547, pl.28, fig.14, N.Z., Recent.
elongata, Verconella Powell, 1927, TNZI 57:555, pl.30, figs.23,24. N.Z., Recent.
enderbyensis, Admete Powell, 1958, BANZARE 6(9):201, pl.1, fig.10. Antarctica, Recent.
enderbyensis, Brookula (Aequispirella) Powell, 1931, RCM 3:372, pl.51, fig.6. N.Z., Recent.
enderbyensis, Limopsis Powell, 1958, BANZARE 6(9):172, pl.1, fig.4. Antarctica, Recent.
enderbyensis, Pleurotomella Powell, 1958, BANZARE 6(9):203, pl.2, fig.8. Antarctica, Recent.
enderbyensis, Puncturella Powell, 1958, BANZARE 6(9):180, pl.2, figs.1,2. Antarctica, Recent.
enderbyensis, Trophon Powell, 1958, BANZARE 6(9):197, pl.3, fig.1. Antarctica, Recent.
enucleata, Cylichnina Powell & Bartrum, 1929, TNZI 60:443, pl.43, figs.66,67. N.Z., Tertiary.
enwrighti, Macrozafra Powell, 1940, TRSNZ 70:242, pl.32, fig.5. N.Z., Recent.
EOSCOBINELLA Powell, 1942, BAIM No.2:122. Type species (OD) *E.tahuia* Powell, 1942. N.Z., Tertiary.
equispiralis, Maoritomella Powell, 1944, RAIM 3(1):39, pl.2, fig.16. Victoria, Australia, Tertiary.
erecta, Austromitra Powell, 1934, TRSNZ 64:156, pl.22, fig.12. N.Z., Recent.
erecta, Etremopsis Powell, 1942, BAIM No.2:152, pl.9, fig.7. N.Z., Tertiary.
ericanum, Xenophalium Powell, 1928, TNZI 59:639, pl.75, fig.29. N.Z., Recent.
errabunda, Anacithara Powell, 1942, BAIM No.2:156, pl.5, fig.10. N.Z., Tertiary.
ETREMOPSIS Powell, 1942, BAIM No.2:151. Type species (OD) *Drillia imperfecta* Suter, 1917. N.Z., Tertiary.
eulima, Striatestea Powell, 1940, TRSNZ 70:227, pl.30, fig.2. N.Z., Recent.
eulimella, Cerithiella Powell, 1958, BANZARE 6(9):186, pl.1, fig.7. Antarctica, Recent.
EUTHRENOPSIS Powell, 1929, TNZI 60:88. Type species (OD) *E.otagoensis* Powell, 1929. N.Z., Recent.
euthriaformis, Cominella (Cominula) Powell, 1929, TNZI 60:96, pl.4, fig.77. N.Z., Recent.
exaltata, Notosetia Powell, 1933, RAIM 1(4):199, pl.34, fig.6. N.Z., Recent.
exaltatus, Seilarex Powell, 1930, TNZI 60:538, pl.60, fig.3. N.Z., Recent.
excelsus, Scrobs Powell, 1933, PMSL 20(4):196, pl.16, fig.5. N.Z., Recent.
exilis, Lippistes Powell, 1958, BANZARE 6(9):188, pl.2, fig.9. Antarctica, Recent.
EXOMILOPSIS Powell, 1964, RAIM 6(1):16. Type species (OD) *Mangelia spica* Hedley, 1907. Australia and New Zealand, Recent.
exoptata, Resania Bartrum & Powell, 1928, TNZI 59:159, pl.26, figs. 13,14. N.Z., Tertiary.
exoptatus, Austrosipho (Verconella) Powell & Bartrum, 1929, TNZI 60:430, pl.34, figs.5,6. N.Z., Tertiary.
expansa, Rissopsis Powell, 1930, TNZI 61:544, pl.88, figs.20,21. N.Z., Recent.
exsculpta, Asperdaphne (Aspertilla) Powell, 1944, RAIM 3(1):60, pl.6, fig.9. Sth. Australia, Tertiary.
exsculpta, Etrema Powell, 1944, RAIM 3(1):54, pl.5, fig.4. Victoria, Australia, Tertiary.
exsculpta, Rugobela Powell, 1944, RAIM 3(1):63, pl.6, fig.5. Victoria, Australia, Tertiary.
exsculptum, Buccinulum (Euthrena) strebeli Powell, 1929, TNZI 60:84, pl.2, figs.33,34. N.Z., Recent.
exsculptus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:143,pl.8, fig.10. N.Z., Tertiary.

exsculptus, Paratrophon Powell, 1933, PMSL 20(4):197, pl.16, figs. 10-14. N.Z., Recent.
exsputa, Baryspira Bartruym & Powell, 1928, TNZI 59:149, pl.28, figs. 28,29. N.Z., Tertiary.
exuta, Haurakia duplicata Powell, 1937, DR 15:192, pl.52, fig.3. N.Z., Recent.
exuta, Syntomodrillia (Hauturua) Powell, 1944, RAIM 3(1):34, pl.2, fig.13, Victoria, Australia, Tertiary.
facinerosa, Cominella Bartrum & Powell, 1928, TNZI 59:148, pl.27, figs.26,27, N.Z., Tertiary.
fairchildi, Notosetia Powell, 1933, RCM 4:36, textfigs.2,3. N.Z., Recent.
fairchildi, Scissurella Powell, 1933, RCM 4:34, p.6, figs.3,4. N.Z., Recent.
fairfieldae, Verconella Powell, 1947, RAIM 3(3):169, pl.18, figs.1,2. N.Z., Recent.
falklandica, Leucosyrinx Powell, 1951, DR 26:169, pl.9, fig.55. Falkland Is, Recent.
falklandica, Philine Powell, 1951, DR 26:178, pl.7, fig.24. Falkland Is, Recent.
fallai, Subonoba Powell, 1955, CEB No.15:78, pl.2, fig.15. N.Z., Recent.
fallai, Wainuia Powell, 1946, RAIM 3(2):124, pl.9, figs.7.8, textfigs. B5-B7, C5. N.Z., Recent.
fallax, Allodiscus Powell, 1952, RAIM 4(3):163, textfig.2. N.Z., Recent.
fallax, Paryphanta Powell, 1930, RAIM 1(1):49, pl.6, figs.2,3. N.Z., Recent.
fallax, Zemitrella Powell, 1940, TRSNZ 70:240, pl.32, fig.3. N.Z., Recent.
FALSILUNATIA Powell, 1951, DR 26:119. Type species (OD) *Natica soluta* Gould, 1848. Sth.America, Recent.
FALSIMARGARITA Powell, 1951, DR 26:93. Type species (OD) *Margarites gemma* E.A.Smith, 1915. Sth. Shetland Is, Recent.
FALSIMOHNIA Powell, 1951, DR 26:137. Type species (OD) *Buccinum albozonatum* Watson, 1882. Kerguelen Is, Recent.
favosa, Crosseola Powell, 1937, DR 15:186, pl.51, fig.13. N.Z., Recent.
fenestrata, Mitrithara Powell, 1944, RAIM 3(1):44, pl.1, fig.14. Victoria, Australia, Tertiary.
fenestrata, Proneptunea Powell, 1951, DR 26:149, pl.6, fig.12. Sth. Georgia, Recent.
fenestrata, Tromina Powell, 1951, DR 26:135, pl.6, fig.14. Falkland Is, Recent.
fenestratus, Antiguraleus Powell, 1942, BAIM No.2:148, pl.8, fig.6. N.Z., Recent.
FENESTRODAPHNE Powell, 1944, RAIM 3(1):60. Type species (OD) *F.pulchrea* Powell, 1944. Sth. Australia, Tertiary.
filicosta, Murdochia Powell, 1948, RAIM 3(4/5):274, pl.53, fig.4. N.Z., Recent.
finlayi, Anacithara Powell, 1942, BAIM No.2:156, pl.5, fig.7. N.Z., Tertiary.
finlayi, Aoteadrillia Powell, 1942, BAIM No.2:93, pl.1, fig.5. N.Z., Tertiary.
finlayi, Austroclavus Powell, 1942, BAIM No.2:119, pl.1, fig.3. N.Z., Tertiary.
finlayi, Austroneaera Powell, 1937, DR 15:175, pl.48, fig.12. N.Z., Recent.
finlayi, Austrotoma Powell, 1938, TRSNZ 68:375, pl.39, figs.16,17. N.Z., Tertiary.
finlayi, Brookula (Aequispirella) Powell, 1933, RAIM 1(4):195, pl.33, fig.1. N.Z., Recent.
finlayi, Buccinulum (Evarnula) Powell, 1929, TNZI 60:76, pl.3, figs. 59,60. N.Z., Recent.
finlayi, Cominella (Paracominia) Powell & Bartrum, 1929, TNZI 60:434, pl.45, figs.80,81. N.Z., Tertiary.
Finlayi, Guraleus (Paraguraleus) Powell, 1944, RAIM 3(1):50, pl.5, fig.12. Victoria, Australia, Tertiary.
finlayi, Haurakia Powell, 1937, DR 15:190, pl.52, fig.1. N.Z., Recent.
finlayi, Ledella Powell, 1935, PMSL 21(4):254, pl.27, figs.5,6. N.Z., Recent.
finlayi, Maoricolpus Powell, 1940, TRSNZ 70:229, pl.33, fig.11. N.Z., Recent.
finlayi, Micantapex Powell, 1940, TRSNZ 70:245. N.Z., Recent.
finlayi, Nemocardium Bartrum & Powell, 1928, TNZI 59:159, pl.29, fig.48. N.Z., Tertiary.
finlayi, Neogaimardia Powell, 1933, PMSL 20(4):203, textfig.16. N.Z., Recent.
finlayi, Neoguraleus Powell, 1942, BAIM No.2:137, pl.6, fig.8. N.Z., Recent.
finlayi, Nepotilla Powell, 1937, DR 15:217, pl.56, fig.8. N.Z., Recent.
finlayi Nobolira (Adolphinoba) Powell, 1930, TNZI 60:537, pl.60, fig.6. N.Z., Recent.
finlayi, Notogenota Powell, 1942, BAIM No.2:79, pl.3, fig.10. N.Z., Tertiary.
finlayi, Pleuromeris Powell, 1938, RAIM 2(3):161, pl.39, figs.7,8. N.Z., Tertiary.
finlayi, Schizotrochus Powell, 1937, DR15:176, pl.49, fig.2. N.Z., Recent.
finlayi, Scrinium Powell, 1942, BAIM No.2:127, pl.11, fig.9. N.Z., Tertiary.
finlayi, Tectisumen Powell, 1937, DR 15:189, pl.49, figs.6,7. N.Z., Recent.

finlayi, Tomopleura Powell, 1942, BAIM No,.2:112, pl.12, fig.10. N.Z., Tertiary.
finlayi, Turbonilla Powell, 1926, TNZI 56;594, pl.104. N.Z., Recent.
finlayi, "Turris" Powell, 1935, RAIM 1(6):338, pl.78, figs.28,29. N.Z., Tertiary.
finlayi, Zeadmete Powell, 1940, TRSNZ 70:242, pl.29, fig.12. N.Z., Recent.
finlayi, Zemitrella Powell, 1933, RAIM 1(4):206, pl.36, fig.6. N.Z., Recent.
flemingi, Austrodiaphana Powell, 1955, CEB No.15:115, pl.3, fig.29. N.Z., Recent.
flemingi, Cellana strigilis Powell, 1955, CEB No.15:72, pl.5, figs. 45-47. N.Z., Recent.
flemingi, Gaimardia trapesina Powell, 1955, CEB No.15:28, pl.1, fig.4. N.Z., Recent.
flemingi, Globisinum Powell, 1931, RAIM 1(2):98, pl.11, figs.10A,10B. N.Z., Tertiary
flemingi, Haliotis Powell, 1938, TRSNZ 68:377, pl.39, fig.18. N.Z., Tertiary.
flemingi, Kerguelenella Powell, 1955, CEB No.15:121, pl.5, fig.44. N.Z., Recent.
flemingi, Maorithyas Powell, 1955, CEB No.15:34, pl.1, fig.1. N.Z., Recent.
flemingi, Sphaerostoma Powell, 1937, RAIM 2(2):120, pl.30, fig.3. N.Z., Recent.
fletcheri, Paryphanta Powell, 1938, RAIM 2(3):135, pl.33, figs.12,13. N.Z., Recent.
flexicostatus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:141, pl.7, fig.5. N.Z., Tertiary.
florida, Paryphanta traversi Powell, 1946, RAIM 3(2):120, pl.10, figs.3,4. N.Z., Recent.
formosa, Lodderena Powell, 1930, TNZI 61:541, pl.87, figs.11,12. N.Z., Recent.
formosa, Splendrillia Powell, 1944, RAIM 3(1):31, pl.2, fig..5. Victoria, Australia, Tertiary.
forsythi, Rhytida Powell, 1952, RAIM 4(3):165, textfig.10. N.Z., Recent.
fossata, Cochlespira pulchella Powell, 1969, IPM 2(10):399, pl.310. Philippines, Recent.
fosterianum, Palliolum Powell, 1933, TNZI 63:370, pl.40, figs.6,7. N.Z., Recent.
foveauxana, Cominella (Eucominia) nassoides Powell, 1946, RAIM 3(2):142, pl.12, figs.3,4. N.Z., Recent.
FUEGOTROPHON Powell, 1951, DR 26:157. Type species (OD) *Fusus crispus* Gould, 1849. Straits of Magellan, Recent.
FUSIGURALEUS Powell, 1942, BAIM No.2:139. Type species (OD) *Clathurella leptosoma* Hutton, 1885. N.Z., Tertiary.
gagei, Paryphanta Powell, 1938, RAIM 2(3):136, pl.33, figs.10,11. N.Z., Recent.
galatheae, Aeneator Powell, 1958, RAIM 5(1):91, pl.12, figs.1,2. N.Z., Recent.
galatheae, Comitas Powell, 1969, IPM 2(10:266, pl.216, figs.6,7. Indonesia, Recent.
galatheae, Fusinus Powell, 1967, RAIM 6(3):197, pl.38, fig.3. Kermadec Is. Recent.
galatheae, Kermadysmea Powell, 1958, RAIM 5(1/2):74, pl.10, fig.4. Kermadec Is, Recent.
gamma, Subonoba Powell, 1955, CEB No.15:77, pl.2, fig.17, N.Z., Recent.
gardneri, Placostylus (Maoristylus) ambagiosus Powell, 1951, RAIM 4(2):135, pl.28, fig.8. N.Z., Subrecent.
gemmata, Merelina Powell, 1927, TNZI 57:537, pl.26, fig.1. N.Z., Recent.
gemmatus, Falsicolus Powell, 1935, RAIM 1(6):336, pl.77, figs.10,11. N.Z., Tertiary.
gemmulata, Austrotoma Powell, 1942, BAIM No.2:76, pl.3, fig.7. N.Z., Tertiary.
gemmuloides, Xenuroturris Powell, 1967, IPM 1(7):443, pl.317. Hawaiian Is, Recent.
georgiana, Trochita Powell, 1951, DR 26:127, pl.7, fig.22. Sth. Georgia, Recent.
georgianus, Venustatrochus Powell, 1951, DR 26:92, pl.10, fig.68. Sth. Georgia, Recent.
gibbosa, Cuna Powell, 1937, DR 15:170, pl.46, fig.4. N.Z., Recent.
gigantea, Schizoglossa Powell, 1930, RAIM 1(1):54, pl.1, figs.5,6. N.Z., Subrecent.
gippslandensis, Etrema Powell, 1944, RAIM 3(1):54, pl.5, fig.2. Victoria, Australia, Tertiary.
gippslandensis, Pseudoinquisitor Powell, 1944, RAIM 3(1):28, pl.3, fig.5. Victoria, Australia, Tertiary.
gittosina, Ostrea (Gigantostrea) Powell & Bartrum, 1929, TNZI 60:401, pl.43, figs.64,65. N.Z., Tertiary.
gittosina, Turritella (Maoricolpus) Powell & Bartrum, 1929, TNZI 60:419, pl.36, fig.20. N.Z., Tertiary.
glaber, Austroclavus Powell, 1944, RAIM 3(1):40, pl.2, fig.1. Victoria, Australia, Tertiary.
gracilis, Liratilia Powell, 1940, TRSNZ 70:241, pl.32, fig.7. N.Z., Recent.
gracilispira, Estea Powell, 1933, RAIM 1(4):201, pl.34, fig.4. N.Z., Recent.

gracilispira, Marshallena Powell, 1969, IPM 2(10):370, pl.281, fig.2. Indonesia, Recent.
gracillimum, Buccinulum (Evarnula) Powell, 1934, RAIM 1(5):270, pl.58, figs.8,9. N.Z., Tertiary.
grahami, Pachymelon (Palomelon) Powell, 1965, RAIM 6(2):166, pl.23, fig.14. N.Z., Recent.
granti, Maurea (Mucrinops) Powell, 1931, RAIM 1(2):97, pl.13, figs 34,35. N.Z., Tertiary.
granolirata, Etrema Powell, 1944, RAIM 3(1):52, pl.5, fig.3. Victoria, Australia, Tertiary.
granulatus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:143, pl.7, fig.2. N.Z., Tertiary.
granulifera, Mitrithara Powell, 1937, DR 15:218, pl.56, fig.9. N.Z., Recent.
guesti, Estea Powell, 1933, RAIM 1(4):200, pl.35, fig.5. N.Z., Recent.
hadfieldi, Rhytida Powell, 1949, RAIM 3(6):362, pl.65, figs.18,19. N.Z., Recent.
hamatadens, Benthocardiella Powell, 1930, TNZI 61:539, figs.7-9. N.Z., Recent.
hamiltoni, Ovaleda Powell, 1935, PMSL 21(4):252, pl.27, figs.1,2. N.Z., Recent.
hamiltoni, Xenophalium Powell, 1928, TNZI 59:639, pl.75, figs.25,26. N.Z., Recent.
hancockae, Notocochlis sagittata Powell, 1971, RAIM 8:215, fig.7. N.Z., Recent.
hancoxi, Placostylus (Maoristylus) ambagiosus Powell, 1951, RAIM 4(2):136, pl.28, fig.3. N.Z., Recent.
haroldi, Cominella (Eucominia) Powell, 1946, RAIM 3(2):142, pl.12, figs.8,9. N.Z., Recent.
haroldi, Etremopsis Powell, 1942, BAIM No.2:154, pl.9, fig.4. N.Z., Tertiary.
haroldi, Maoridaphne Powell, 1942, BAIM No.2:163, pl.4, fig.7. N.Z., Tertiary.
haroldi, Scrinium Powell, 1944, RAIM 3(1):45, pl.1, fig.10. Victoria, Australia, Tertiary.
harpaformis, Morum (Oniscidia) Powell & Bartrum, 1929, TNZI 609:428, pl.49, figs.104,105. N.Z., Tertiary.
harpovoluta, Admete Powell, 1957, BANZARE 6(7):143, pl.1, fig.3. Macquarie Is, Recent.
harrisi, Guraleus Powell, 1944, RAIM 3(1):48, pl.6, fig.15. Victoria, Australia, Tertiary.
harrisonae, Legrandina Powell, 1935, PMSL 21(4):256, pl.28, fig.2. N.Z., Recent.
harrisonae, Lissarca Powell, 1927, RCM 3(2):120, pl.22, fig.5. N.Z., Recent.
harrisonae, Merelina Powell, 1939, RAIM 2(4):231, pl.49, fig.2. N.Z., Recent.
harrisonae, Mysticoncha Powell, 1946, RAIM 3(2):144, pl.11, fig.6. N.Z., Recent.
harrisonae, Xenophalium Powell, 1928, TNZI 59:640, pl.75, figs.27,28. N.Z., Recent.
harveyi, Paryphanta superba Powell, 1946 RAIM 3(2):110, pl.9, figs.5,6. N.Z., Recent.
HAURAKIOPSIS Powell, 1937, DR 15:192. Type species (OD) *H.pellucida* Powell, 1937. N.Z., Recent.
HAUTURUA Powell, 1942, BAIM No.2:105. Type species (OD) *H.vivens* Powell, 1942. N.Z., Recent.
haweraensis, Austrosipho (Verconella) Powell, 1931, RAIM 1(2):104, pl.13, figs.28,29. N.Z., Tertiary.
haweraensis, Emarginula Powell, 1931, RAIM 1(2):96, pl.11, fig.17. N.Z., Tertiary.
haweraensis, Zeacolpus (Stiracolpus) Powell, 1931, RAIM 1(2):101, pl.10, fig.7. N.Z., Tertiary.
hectori, Pleuromeris Powell, 1938, RAIM 2(3):160, pl.39, figs.9,10. N.Z., Tertiary.
hedleyi, Prosipho Powell, 1958, BANZARE 6(9):195, pl.2, fig.7. Antarctica, Recent.
hedleyi, Toledonia Powell, 1958, BANZARE 6(9):206. Nom, nov. pro *Toledonia major eleata* Hedley, 1916. Antarctica, Recent.
hesterna, Macoma Powell & Bartrum, 1929, TNZI 60:404, pl.44, fig.76. N.Z., Tertiary.
hesterna, Marginella Bartrum & Powell, 1928, TNZI 59:149, pl.28, figs.30,31. N.Z., Tertiary.
heteromorphum, Buccinulum (Euthrena) heteromorphum Powell, 1929, TNZI 60:85, pl.2, figs.47-49. N.Z., Recent.
HETEROTURRIS Powell, 1967, IPM 1(7):411. Type species (OD) *H.sola* Powell, 1967. Philippines, Recent.
hexagonalis, Cyclopecten Powell, 1958, BANZARE 6(9):176, pl.1, fig.3. Antarctica, Recent.
hiatula, Verconella Powell, 1947, RAIM 3(3):166, pl.17, fig.3. N.Z., Tertiary.
hinemoa, Margarella Powell, 1955, CEB No.15:57, pl.1, fig.5. N.Z., Recent.

hinemoa, Placostylus (Maoristylus) ambagiosus Powell, 1947, RAIM 3(3):182, pl.20, figs.4-6. N.Z., Subrecent.
hipkinsi, Exoimilopsis Powell, 1964, RAIM 6(1):17, pl.3, fig.7. N.Z., Recent.
hirsutissima, Murdochia Powell, 1951, RAIM 4(2):132, pl.27, fig.6. N.Z., Recent.
hirsutus, Phrixgnathus (Taguahelix) Powell, 1955, CEB No.15:126, pl.4, fig.32. N.Z., Recent.
hounselli, Virmysella Powell, 1931, RAIM 1(2):111, pl.11, figs.13,14. N.Z., Tertiary.
hulmei, Proxiuber Powell, 1954, RAIM 4(4):235, textfig. N.Z., Recent.
illepida, Struthiolaria Bartrum & Powell, 1928, TNZI 59:143, pl.30, fig.62. N.Z., Tertiary.
impar, Marshallena Powell, 1942, BAIM No.2:83, pl.14, fig.2. N.Z., Tertiary.
imparilirata, Mauidrillia Powell, 1942, BAIM No.2:86, pl.1, fig.8. N.Z., Tertiary.
imperfecta, Verconella Powell, 1947, RAIM 3(3):168, pl.18, figs.6,7. N.Z., Tertiary.
inaequalis, Mauidrillia Powell, 1942, BAIM No.2:86, pl.1, fig.11. N.Z., Tertiary.
incisus, Guraleus (Paraguraleus) Powell, 1944, RAIM 3(1):51, pl.5, fig.14. Sth. Australia, Tertiary.
incrassata, Struthiolaria (Pelicaria) Powell, 1931, RAIM 1(2):101, pl.13, figs.30-33. N.Z., Tertiary.
inexpectata, Austrotoma Powell, 1944, RAIM 3(1):23, pl.7, figs.6,7. Tasmania, Australia. Tertiary.
inexpectata, Zemacies Powell, 1942, RAIM 3(1):21, pl.7, fig.8. Victoria, Australia, Tertiary.
inornata, Subonoba Powell, 1933, RAIM 1(4):202, pl.35, fig.3. N.Z., Recent.
insulana, Perrierina Powell, 1933, RAIM 1(4):188, pl.34, fig.1. N.Z., Recent.
insularis, Rangitotoa Powell, 1933, TNZI 63:148, textfig.1. N.Z., Recent.
INTEGRADRILLIA Powell, 1942, BAIM No.2:94. Type species (OD) *Drillia integra* Tenison-Woods, 1880. Victoria, Australia, Tertiary.
intermedia, Lepsiella Powell & Bartrum, 1929, TNZI 60:439, pl.48, figs.97-100. N.Z., Tertiary.
interpolata, Gemmula Powell, 1967, IPM 1(7):435, pl.311, figs.1-3. Hawaiian Is, Recent.
interruptus, Neoguraleus Powell, 1942, BAIM No.2:136, pl.6, fig.6. N.Z., Recent.
intertexta, Crosseola Powell, 1937, DR 15:187, pl.51, fig.12. N.Z., Recent.
intertexta, Liratomina Powell, 1944, RAIM 3(1):26, pl.7, fig.4. Victoria, Australia, Tertiary.
intricata, Turris crispa Powell, 1964, IPM 1(5):332, pl.254, fig.4. Hawaiian Is, Recent.
intumescens, Mauidrillia Powell, 1944, RAIM 3(1):37, pl.4, fig..4. Victoria, Australia. Tertiary.
iota, Lodderia Powell, 1940, TRSNZ 70:220, pl.28, fig..6. N.Z., Recent.
iredalei, Aequipecten (Corymbichlamys) Powell, 1958, RAIM 5(1/2):68, pl.11, fig.1, Kermadec Is, Recent.
iredalei, Austronoba Powell, 1937, DR 15:192, pl.52, fig.12. N.Z., Recent.
iredalei, Mitropifex Powell, 1958, RAIM 5(1/2):81, pl.11, fig.3. Kermadec Is, Recent.
iredalei, Salaputium Powell, 1958, RAIM 5(1/2):72, pl.9, fig.6. Kermadec Is, Recent.
jaculoides, Alcithoe arabica Powell, 1924, PMSL 16(2):108, figs.1-3. N.Z., Recent.
jamesoni, Paryphanta Powell, 1936, RAIM 2(1):35, pl.8, figs.3,4. N.Z., Recent.
janjukiensis, Anacithara Powell, 1944, RAIM 3(1):58, pl.5, fig.10. Tasmania, Australia, Tertiary.
janjukiensis, Austrotoma Powell, 1944, RAIM 3(1):24, pl.3, fig.1. Victoria, Australia, Tertiary.
janjukiensis, Etrema Powell, 1944, RAIM 3(1):52, pl.5, fig.1. Tasmania, Australia, Tertiary.
janjukiensis, Guraleus Powell, 1944, RAIM 3(1):47, pl.4, fig.2. Victoria, Australia, Tertiary.
jason, Margarella Powell, 1951, DR 26:97, pl.5, fig.1. Sth. Georgia, Recent.
jeakingsi, Verconella Powell, 1947, RAIM 3(3):167, pl.17, fig.1. N.Z., Recent.
johnsoni, Rhytida (Rhytidarex) Powell, 1948, RAIM 3(4/5):281, pl.55, figs.10-12. N.Z., Recent.
johnstoni, Alcithoe Powell, 1928, TNZI 59:363, pl.53, figs.7,8. N.Z., Recent.
johnstoni, Paryphanta unicolorata Powell, 1946, RAIM 3(2):107, pl.9, figs.3,4. N.Z., Recent.
kaawaensis, Neojanacus Bartrum & Powell, 1928, TNZI 59:143, pl.27, figs.16-19. N.Z., Tertiary.

kaawaensis, Rochefortula Bartrum & Powell, 1928, TNZI 59:157, pl.29, figs.51,52. N.Z., Tertiary.
kaawaensis, Xenophalium Bartrum & Powell, 1928, TNZI 59:145, pl.30, figs.53,54. N.Z., Tertiary.
KAAWATINA Bartrum & Powell, 1928, TNZI 59:141. Type species (OD) *K.turneri* Bartrum & Powell, 1928. N.Z., Tertiary.
kahurangica, Paryphanta gilliesi Powell, 1936, RAIM 2(1):33, pl.8, figs.1,2. N.Z., Recent.
kaiiwiensis, Myadora Powell, 1931, RAIM 1(2):111, pl.14, figs.37,38. N.Z., Tertiary.
kaikouraense, Buccinulum (Euthrena) Powell, 1929, TNZI 60:82, pl.1, figs.11,12. N.Z., Recent.
kaiparaensis, Austrotoma Powell, 1942, BAIM No.2:73, pl.3, fig.9. N.Z., Tertiary.
kaipara, Etrema Powell, 1942, BAIM No.2:150, pl.10, fig.3. N.Z., Tertiary.
kawauensis, Cookia Powell, 1938, TRSNZ 68:378, pl.39, fig.15. N.Z., Tertiary.
keenorum, Placostylus (Maoristylus) ambagiosus Powell, 1947, RAIM 3(3):186, pl.22, figs.1-5. N.Z., Recent.
kempae, Agnewia Powell,.1934, RAIM 1(5):273, pl.59, figs.19,20. N.Z., Tertiary.
kempi, Cominella (Cominula) Powell, 1934, RAIM 1(5):272, pl.58, figs. 12,13. N.Z., Tertiary.
kempi, Solariella Powell, 1951, DR 26:102, pl.1, fig.6. Falkland Is, Recent.
KERGUELENATICA Powell, 1951, DR 26:117. Type species (OD) *Natica grisea* von Martens, 1878. Kerguelen Is, Recent.
kermadecensis, Austronoba Powell, 1927, TNZI 57:542, pl.27, fig.8. Kermadec Is, Recent.
kermadecensis, Ravitrona tomlini Powell, 1958, RAIM 5(1/2):79, pl.10, fig.5. Kermadec Is, Recent.
KERMADYSMEA Powell, 1958, RAIM 5(1/2):73. Type species (OD) *K.galatheae* Powell, 1958. Kermadec Is, Recent.
KERMASPRELLA Powell, 1958, RAIM 5(1/2):83, Type species (OD) *Conus raoulensis* Powell, 1958. Kermadec Is, Recent.
kingae, Xenuroturris Powell, 1964, IPM 1(5):325, pl.252, fig.6. Hawaiian Is, Recent.
kingi, Argalista Powell, 1938, RAIM 2(3):162, textfigs.1,2. N.Z., Tertiary.
kirai, Comitas Powell, 1969, IPM 2(10):279, pl.223, figs.4-6. Japan, Recent.
kiwaensis, Chlamys Powell, 1933, TNZI 63:371, pl.40, figs.1-5. N.Z., Recent.
koruahinensis, Austrodrillia Bartrum & Powell, 1928, TNZI 59:150, pl.28, figs.36,37. N.Z., Tertiary.
koruahinensis, Venericardia Bartrum & Powell, 1928, TNZI 59:155, pl.26, figs.10,11. N.Z., Tertiary.
koruahinensis, Verconella Bartrum & Powell, 1928, TNZI 59:146, pl.30, figs.59,60. N.Z., Tertiary.
labyrinthica, Laoma Powell, 1948, RAIM 3(4/5):277, pl.54, fig.3. N.Z., Recent.
lacteola, Dardanula roseola Powell, 1955, CEB No. 15:88, pl.3, fig.24. N.Z., Recent.
lacunosa, Promerelina Powell, 1940, TRSNZ 70:227, pl.30, fig.9. N.Z., Recent.
laevicordatum, Zebittium Powell, 1937, DR 15:204, pl.54, fig.3. N.Z., Recent.
laevicostata, Cosa Powell, 1933, PMSL 20(4):200, pl.18, figs.3,4. N.Z., Recent.
LAEVILACUNARIA Powell, 1951, DR 26:108. Type species (OD) *Pellilitorina bransfieldensis* Preston, 1916. Sth. Shetlands, Recent.
laevirostris, Zemitrella Powell, 1940, TRSNZ 70:241, pl.32, fig.2. N.Z., Recent.
LAOMAREX Powell, 1948, RAIM 3(4/5):278. Type species (OD) *L.sericea* Powell, 1948, N.Z., Recent.
larochei, Aoteatilia Powell, 1940, TRSNZ 70:241, pl.32, fig.8. N.Z., Recent.
larochei, Euchelus (Herpetopoma) Powell, 1926, PMSL 17(1):361, textfig. N.Z., Recent.
larochei, Eulimella Powell, 1930, TNZI 61:544, pl.88, fig.22. N.Z., Recent.
larochei, Laoma (Phrixgnathus) Powell, 1928, TNZI 59:367, pl.54, fig.5. N.Z., Recent.
larochei, Marginella (Glabella) Powell, 1932, TNZI 62:208, pl.34, figs.16,17. N.Z., Recent.
larochei, Mysella Powell, 1940, TRSNZ 70:218, textfig.1A. N.Z., Recent.
larochei, Splendrillia Powell, 1940, TRSNZ 70:243, pl.31, fig.8. N.Z., Recent.

LAROCHELLA Powell, 1927, TNZI 57:539. Type species (OD) *L.toreuma* Powell, 1927, N.Z. Recent.
lateumbilica, Paryphanta spedeni Powell, 1946, RAIM 3(2):105, textfigs.A7,A8. N.Z., Recent.
latiapex, Etremopsis Powell, 1942, BAIM No.2:154, pl.9, fig.5. N.Z., Tertiary.
latiuscula, Pleuromeris Powell, 1937, DR 15:170, pl.45, fig.5. N.Z., Recent.
latizona, Paryphanta traversi Powell, 1949, RAIM 3(6):359, pl.64, figs.6-8, N.Z., Recent.
lawsei, Struthiolaria Powell & Bartrum, 1929, TNZI 60:421, pl.35, figs.9-11. N.Z., Tertiary.
lawsi, Austrotoma Powell, 1942, BAIM No.2:75, pl.3, fig.8. N.Z., Tertiary.
lawsi, Chemnitzia Powell, 1937, DR 15:210, pl.54, fig.8. N.Z., Recent.
lawsi, Gemmula Powell, 1942, BAIM No.2:50, pl.13, fig.12. N.Z., Tertiary.
lawsi, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:142, pl.7, fig.8. N.Z., Tertiary.
lawsi, Phenatoma Powell, 1942, BAIM No.2:108, pl.10, fig.9. N.Z., Tertiary.
lawsi, Syrnola Powell, 1934, RAIM 1(5):266, pl.57, figs.1,2. N.Z., Tertiary.
laxa, Antimitrella Powell, 1937, DR 15:214, pl.56, fig.7. N.Z., Recent.
laxa, Cirsonella Powell, 1937, DR 15:184, pl.50, figs.8.9. N.Z., Recent.
lemchei, Chlamydella favus Powell, 1958, RAIM 5(1/2):70, pl.9, figs.7,8. Kermadec Is, Recent.
LEPTOCOLLONIA Powell, 1951, DR 26:105. Type species (OD) *L.thielei* Powell, 1951. Sth. Georgia, Recent.
lesleyae, Placostylus (Maoristylus) ambagiosus Powell, 1947, RAIM 3(3):184, pl.21, figs.4-6. N.Z., Subrecent.
lignaria, Cominella (Paracominia) Powell &Bartrum, 1929, TNZI 60:433, pl.45, figs.82-84. N.Z., Tertiary.
lincta, Brookula Powell, 1940, TRSNZ 70:222, pl.29, fig.9. N.Z., Recent.
lincta, Splendrillia Powell, 1942, BAIM No.2:101, pl.12, fig.1. N.Z., Tertiary.
LIRASYRINX Powell, 1942, BAIM No.2:69. Type species (OD) *L.anomala* Powell, 1942. N.Z., Tertiary.
LIRATOMINA Powell, 1942, BAIM No.2:72. Type species (OD) *Bela sculptilis* Tate, 1888. Victoria, Australia, Tertiary.
liratula, Waitara Powell, 1942, BAIM No.2:169, pl.14, fig.8. N.Z., Tertiary.
LISSOTESTELLA Powell, 1946, RAIM 3(2):140. Type species (OD) *Lissoteseta tenuilirata* Powell, 1931. N.Z., Recent.
longicolle, Buccinulum (Evarnula) Powell, 1929, TNZI 60:72, pl.4, figs.58,69. N.Z., Tertiary.
longwoodensis, Gemmula Powell, 1942, BAIM No.2:49, pl.13, fig.13. N.Z., Tertiary.
LORABELA Powell, 1951, DR 16:171. Type species (OD) *Bela pelseneri* Strebel, 1908. Sth. Georgia, Recent.
ludbrookae, Filodrillia Powell, 1944, RAIM 3(1):57, pl.5, fig.9. Sth. Australia, Tertiary.
ludbrookae, Guraleus Powell, 1944, RAIM 3(1):47, pl.4, fig.3. Sth. Australia, Tertiary.
ludbrookae, Tomopleura Powell, 1944, RAIM 3(1):38, pl.2, fig.14. Sth. Australia, Tertiary.
ludbrookae, Syntomodrillia Powell, 1944, RAIM 3(1):34, pl.2, fig.10. Sth. Australia, Tertiary.
lusca, Paryphanta lignaria Powell, 1949, RAIM 3(6):350, pl.66, fig.2. N.Z., Recent.
luteola, Zeminolia Powell, 1937, DR 15:179, pl.51, figs.1,2. N.Z., Recent.
luzonica, Comitas Powell, 1969, IPM 2(10):269, pl.225, fig.7. Philippines, Recent.
luzonica, Pinguigemmula Powell, 1964, IPM 1(5):278, pl.215, figs. 3,4. Philippines, Recent.
lygdinopsis, ? Austroclavus Powell, 1944, RAIM 3(1):41, pl.2, fig.4. Victoria, Australia, Tertiary.
maclurgi, Linemera Powell, 1933, RAIM 1(4):202, pl.33, fig.2. N.Z., Recent.
macquariensis, Kerguelenia Powell, 1939, RAIM 2(4):238, pl.49, figs. 9,10. Macquarie Is, Recent.
macquariensis, Trophon Powell, 1957, BANZARE 6(7):143, pl.1, fig.6. Macquarie Is, Recent.
macrobertsoni, Leucosyrinx Powell, 1958, BANZARE 6(9):202, pl.3, fig.5. Antarctica, Recent.
major, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:141, pl.7, fig.3. N.Z., Tertiary.
major, Schizoglossa Powell, 1938, RAIM 2(3):139, pl.33, figs.15,16. N.Z., Subrecent.

maketuense, Buccinulum (Euthrena) Powell, 1929, TNZI 60:85, pl.2, figs.31,32. N.Z., Recent.
MANAWATAWHIA Powell, 1937, DR 15:199. Type species (OD) *M.analoga* Powell, 1937. N.Z., Recent.
manawatawhia, Cuna Powell, 1937, DR 15:169, pl.46, fig.5. N.Z., Recent.
manawatawhia, Estea Powell, 1937, DR 15:198, pl.53, fig.3. N.Z., Recent.
manawatawhia, Marginella (Glabella) Powell, 1937, DR 15:216, pl.55, fig.4. N.Z., Recent.
manawatawhia, Merelina Powell, 1937, DR 15:193, pl.52, fig.8. N.Z., Recent.
manawatawhia, Mocella Powell, 1935, PMSL 21(4):246, pl.26, figs. 6-8. N.Z., Recent.
manawatawhia, Munditia Powell, 1937, DR 15:181, pl.50, figs.1,2. N.Z., Recent.
manawatawhia, Nobolira Powell, 1937, DR 15:196, pl.52, fig.16. N.Z., Recent.
manawatawhia, Nuculana (Jupiteria) Powell, 1937, DR 15:164, pl.45, fig.9. N.Z., Recent.
manawatawhia, Puncturella Powell, 1937, DR 15:177, pl.48, figs.7,8. N.Z., Recent.
manawatawhia, Rissoina Powell, 1937, DR 15:202, pl.53, fig.5. N.Z., Recent.
manawatawhia, Scissurella Powell, 1937, DR 15:175, pl.49, fig.1. N.Z., Recent.
mancus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:140, pl.7, fig.9, N.Z., Tertiary.
mandarinoides, Verconella adusta Powell, 1927, TNZI 57:558, pl.31, figs.31,32. N.Z., Recent.
mangonuica, Eulima Powell, 1940, TRSNZ 70:234, pl.31, figs.3,4. N.Z., Recent.
manukauensis, Maoricolpus rosea Powell, 1931, RAIM 1(2):99, pl.10, figs.9,10. N.Z., Recent.
manukauensis, Neoguraleus Powell, 1942, BAIM No.2:137, pl.6, fig.4. N.Z., Recent.
maoria, Aclis Powell, 1937, DR 15:209, pl.56, fig.12. N.Z., Recent.
maoria, Balcis Powell, 1940, TRSNZ 70:234, pl.31, fig.2. N.Z., Recent.
maoria, Closia Powell, 1937, DR 15:217, pl.55, fig.1. N.Z., Recent.
maoria, Dimya Powell, 1937, DR 15:168, pl.45, fig.2. N.Z., Recent.
maoria, Divariscintilla Powell, 1932, PMSL 20(1):66, pl.6, fig.1. N.Z., Recent.
maoria, Elysia Powell, 1937, RAIM 2(2):121, pl.30, fig.5. N.Z., Recent.
maoria, Fossarus Powell, 1937, DR 15:190, pl.49, figs.8,9. N.Z., Recent.
maoria, Gazameda Powell, 1940, TRSNZ 70:230, pl.33, fig.7. N.Z., Recent.
maoria, Ividella Powell, 1940, TRSNZ 70:233, pl.29, fig.5. N.Z., Recent.
maoria, Kellia Powell, 1933, TNZI 63:151, textfig.2. N.Z., Recent.
maoria, Myrtea Powell, 1935, RAIM 1(6):330, pl.76, fig.2. N.Z., Tertiary.
maoria, Opimilda Powell, 1940, TRSNZ 70:230, p.29, fig.7. N.Z., Recent.
maoria, Pedicularia Powell, 1937, DR15:208, pl.54, figs. 13,14. N.Z., Recent.
maoria, Pronucula Powell, 1937, DR 15:163, pl.45, fig.8. N.Z., Recent.
maoria, Siliquaria Powell, 1940, TRSNZ 70:231, pl.33, figs.3-5. N.Z., Recent.
maoria, Starkeyna Powell, 1937, DR 15:185, pl.49, figs.10,11. N.Z., Recent.
maoria, Tonna Powell, 1938, RAIM 2(3):166, pl.40, figs.5,6. N.Z., Recent.
maoria, Turridrupa Powell, 1942, BAIM No.2:117, pl.11, fig.10. N.Z., Tertiary.
maoria, Willungia Powell, 1938, TRSNZ 68:370, pl.39, figs.8,9. N.Z., Tertiary.
maoria, Zeidora Powell, 1937, DR 15:177, pl;.48, figs.9,10. N.Z., Recent.
maoriana, Marginella (Volvarina) Powell, 1932, TNZI 62:209, pl.36, fig.21. N.Z., Recent.
maoriana, Merelina Powell, 1939, RAIM 2(4):231, pl.49, fig.1. N.Z., Recent.
maoriana, Vermicularia Powell, 1937, DR 15:207, pl.55, figs.9,10. N.Z., Recent.
maorianus, Heliacus Powell, 1934, RAIM 1(5):268, pl.58, figs.5-7. N.Z., Recent.
MAORIDAPHNE Powell, 1942, BAIM No.2:162. Type species (OD) *Daphnella clifdenica* Laws, 1939. N.Z., Tertiary.
MAORIMORPHA Powell, 1939, RAIM 2(4):235. Type species (OD) *Mitromorpha suteri* Murdoch, 1905. N.Z., Recent.
MAORITOMELLA Powell, 1942, BAIM No.2:113. Type species (OD) *Pleurotoma albula* Hutton, 1873. N.Z., Recent.
marchanti, Paryphanta Powell, 1932, RAIM 1(3):158, pl.28, figs.1,2. N.Z., Recent.
mariae, Buccinulum (Euthrena) Powell, 1940, TRSNZ 70:238, pl.33, figs.1,23. N.Z., Recent.
mariae, Coluzea Powell, 1952, RAIM 4(3):180, pl.35, fig.8. N.Z., Recent.
mariae, Macrozafra Powell, 1940, TRSNZ 70:242, pl.32, fig.6. N.Z., Recent.
mariae, Pervicacia Powell, 1940, TRSNZ 70:246, pl.33, fig.15. N.Z., Recent.

marlboroughensis, Cominella (Eucominia) Powell, 1946, RAIM 3(2):143, pl.12, fig.10. N.Z., Recent.
marshalli, Austroclavus Powell, 1942, BAIM No.2:120, pl.1, fig.2. N.Z., Tertiary.
marshalli, Eucrassatella Powell, 1931, RAIM 1(2):93, pl.12, figs. 21,22. N.Z., Tertiary.
marsupialis, Fectola Powell, 1941, RAIM 2(5):260, pl.51, fig.9. N.Z., Recent.
marwicki, Awateria Powell, 1942, BAIM No.2:129, pl.11, fig.5. N.Z., Tertiary.
marwicki, Lima Powell, 1926, RCM 3(1):48, pl.6, figs.3,4. N.Z., Tertiary.
marwicki, Limopsis Powell, 1938, RAIM 2(3):159, pl.39, figs.3-5. N.Z., Tertiary.
marwicki, Lornia Powell, 1935, RAIM 1(6):339, pl.78, figs.23,24. N.Z., Tertiary.
marwicki, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:142, pl.7, fig.7. N.Z., Tertiary.
marwicki, Rhizorus Bartrum & Powell, 1928, TNZI 59:152, pl.28, figs.40,41. N.Z., Tertiary.
marwicki, Rinigicula Powell, 1935, RAIM 1(6):339, pl.78, fig.25. N.Z., Tertiary.
marwicki, Uberella Powell, 1935, RAIM 1(6):335, pl.78, fig.19. N.Z., Tertiary.
marwicki, Uttleya Powell, 1952, RAIM 4(3):179, pl.36, fig.6. N.Z., Recent.
matai, Xenophalium (Xenogalea) Powell, 1952, RAIM 4(3):178, pl.35, fig..6. N.Z., Recent.
MAUIDRILLIA Powell, 1942, BAIM No.2:85. Type species (OD) *Mangilia praecophinodes* Suter, 1917. N.Z., Tertiary.
maunganuica, Austrodiaphana Powell, 1952, RAIM 4(3):185, pl.36, fig.7. N.Z., Recent.
mawsoni, Leucosyrinx Powell, 1958, BANZARE 6(9):201, pl.3, fig.4. Antarctica, Recent.
mawsoni, Parmaphorella Powell, 1958, BANZARE 6(9):180, pl.3, fig.9. Antarctica, Recent.
mawsoni, Trophon Powell, 1957, BANZARE 6(9):142, pl.2, figs.6-8. Macquarie I, Recent.
maxima, Lepsiella Powell & Bartrum, 1929, TNZI 60:438, pl.48, figs.101,102. N.Z., Tertiary.
mayi, Cuna Powell, 1930, TNZI 60:532, pl.60, figs.1,2. N.Z., Recent.
melvilli, Paradrillia Powell, 1969, IPM 2(10):314, pl.245, figs.1,2. Persian Gulf, Recent.
mestayerae, Buccinulum (Euthrena) strebeli Powell, 1929, TNZI 60:84, pl.1, figs.27,28. N.Z., Recent.
mestayerae, Perrierina Powell, 1933, PMSL 20(5):232, textfig.2. N.Z., Recent.
micans, Argalista Powell, 1931, RCM 3:374, pl.51, fig.4. N.Z., Recent.
michiei, Placostylus (Maoristylus) ambagiosus Powell, 1951, RAIM 4(2):134, pl.28, fig.1. N.Z., Recent.
migratoria, Cochlis Powell, 1927, TNZI 57:560, pl.33, figs.3-6. N.Z., Recent.
minima, Pachykellya Powell, 1931, RCM 3:372, textfig. N.Z., Recent.
miniscula, Venericardia (Pleuromeris) Bartrum & Powell, 1928, TNZI 59:156, pl.26, fig.12. N.Z., Tertiary.
minuscula, Haurakia Powell, 1955, CEB No.15:81, pl.3, fig.26. N.Z.. Recent.
minutula, Dardanula Powell, 1937, DR 15:204, pl.53, fig.14. N.Z., Recent.
minutula, Estea Powell, 1933, RCM 4:37, pl.6, fig.6. N.Z., Recent.
miocenica, Heterocithara Powell, 1944, RAIM 3(1):57, pl.4, fig.11. Victoria, Australia, Tertiary.
miocoronifera, Gemmula Powell, 1964, IPM 1(5):254, pl.194, figs.1,2. Nom. subst. pro *Pleurotoma coronifer* K.Martin, 1879, Indonesia, Tertiary.
mirabilis, Cominella (Eucominia) Powell, 1929, TNZI 60:93, pl.4, fig.76. N.Z., Recent.
mirabilis, Etrema Powell, 1944, RAIM 3(1):54, pl.5, fig.5. Victoria, Australia, Tertiary.
mirificus, Melliteryx Powell & Bartrum, 1929, TNZI 60:403, pl.39, fig.41. N.Z., Tertiary.
mitchelsoni, Bathytoma Powell, 1935, RAIM 1(6):337, pl.77, figs. 15,16. N.Z., Tertiary.
MITRELLATOMA Powell, 1942, BAIM No.2:109. Type species (OD) *Columbella angustata* Hutton, 1886. N.Z., Tertiary.
monstrosa, Cavineptunea Powell, 1951, DR 26:145, pl.8, figs.38,39. Sth. Georgia, Recent.
montana, Paryphanta gilliesi Powell, 1936, RAIM 2(1):33, pl.8, figs.9,10. N.Z., Recent.
morioria, Estea Powell, 1933, RAIM 1(4):200, pl.35, fig.6. N.Z., Recent.
morioria, Haliotis virginea Powell, 1938, RAIM 2(3):165, pl.40, figs.1,2. N.Z., Recent.
morioria, Maurea pellucida Powell, 1946, RAIM 3(2):140, pl.11, fig.3. N.Z., Recent.

morioria, Micrelenchus sanguineus Powell, 1933, RAIM 1(4):195, pl.36, figs.10,11. N.Z., Recent.
morioria, Subonoba Powell, 1933, RAIM 1(4):203, pl.35, fig.2. N.Z., Recent.
motutaraense, Buccinulum (Euthrena) Powell, 1929, TNZI 60:86, pl.2, figs.41,42. N.Z., Recent.
motutaraensis, Calliotropis Powell, 1935, RAIM 1(6):333, pl.77, figs.12-14. N.Z., Tertiary.
motutaraensis, Nuculana (Saccella) Powell, 1935, RAIM 1(6):330, pl.76, fig.1. N.Z., Tertiary.
motutaraensis, Polinices Powell, 1935, RAIM 1(6):335, pl.78, figs.17,18. N.Z., Tertiary.
motutaraensis, Pteromyrtea Powell, 1935, RAIM 1(6):331, pl.76, fig.4. N.Z., Tertiary.
motutaraensis, Thyasira (Prothyasira) Powell, 1935, RAIM 1(6):332, pl.76, fig.7. N.Z., Tertiary.
motutarensis, Alcithoe swainsoni Powell, 1928. TNZI 59:361, pl.56, figs.3,4. N.Z., Recent.
mouatae, Paryphanta Powell, 1936, RAIM 2(1):31, pl.8, figs.7,8. N.Z., Recent.
mouatae, Taron Powell, 1940, TRSNZ 70:237, pl.33, fig.6. N.Z., Recent.
multigemmata, Venustas punctulata Powell, 1952, RAIM 4(3):173, pl.35, figs.2,3. N.Z., Recent.
multilinea, Atalacmea Powell, 1934, TRSNZ 64:154, pl.21, figs.1,3. N.Z., Recent.
multilineum, Buccinulum (Evarnula) Powell, 1929, TNZI 60:78, pl.1, figs.17,18. N.Z., Recent.
multilirata, Notosetia Powell, 1940, TRSNZ 70:228, pl.31, fig.10. N.Z., Recent.
multinodosa, Euspinacassis Powell, 1928, TNZI 59:634, pl.76, figs. 30,31. N.Z., Tertiary.
murdochi, Pleuromeris Powell, 1938, RAIM 2(3):161, pl.39, fig.6. N.Z., Tertiary.
murdochi, Zeacuminia Powell, 1931, RAIM 1(2):107, pl.14, fig.42. N.Z., Tertiary.
murrayi, Gemmula Powell, 1964, IPM 1(5):248, pl.186, fig.4. Persian Gulf, Recent.
mutabile, Buccinulum (Evarnula) Powell, 1929, TNZI 60:78, pl.2, figs. 35-37. N.Z., Recent.
nana, Anacithara Powell, 1942, BAIM No.2:156, pl.5, fig.11. N.Z., Tertiary.
nana, Asaphis Powell, 1958, RAIM 5(1/2):75, pl.9, fig.5. Kermadec Is, Recent.
nana, Lodderena Powell, 1930, TNZI 61:541, pl.87, figs.13,14. N.Z., Recent.
nanum, Scrinium Powell, 1944, RAIM 3(1):45, pl.1, fig.9. Victoria, Australia, Tertiary.
nasuta, Wainuia urnula Powell, 1946, RAIM 3(2):123, pl.9, fig.9, textfigs.B11-B14. N.Z., Recent.
nautiliformis, Zerotula Powell, 1927, RCM 3(2):118, pl.21, fig.5. N.Z., Recent.
NEOGURALEUS Powell, 1939, RAIM 2(4):236. Type species (OD) *Drillia sinclairi* Gillies, 1882. N.Z., Recent.
neozelanica, Borniola Powell, 1937, DR 15:173, pl.47, fig.8. N.Z., Recent.
neozelanica, Chileutomia Powell, 1940, TRSNZ 70:235, pl.31, fig.5. N.Z., Recent.
neozelanica, Epicodakia Powell, 1937, DR 15:171, pl.46, fig.8. N.Z., Recent.
neozelanica, Naricava (Tropidorbis) Powell, 1940, TRSNZ 70:223, pl.29, figs.10,11. N.Z., Recent.
nervosa, Austrotoma Powell, 1942, BAIM No.2:76, pl.14. fig.6. N.Z., Tertiary.
ngatuturaensis, Austrofusus (Neocola) Bartrum & Powell, 1928, TNZI 59:147, pl.30, figs.57,58. N.Z., Tertiary.
ngatuturaensis, Guraleus Bartrum & Powell, 1928, TNZI 59:151, pl.28, figs.34,35. N.Z., Tertiary.
nitidula, Nepotilla Powell, 1940, TRSNZ 70:246, pl.32, fig.9. N.Z., Recent.
nitidulaformis, Nucula Powell, 1971, RAIM 8:227, figs.27,28. N.Z., Recent.
nivosa, Ovirissoa Powell, 1957, BANZARE 6(7):141, pl.1, fig.7. Macquarie I, Recent.
nodulosa, Rugobela Powell, 1942, BAIM No.2:161, pl.11, fig.11. N.Z., Tertiary.
NOTOGENOTA Powell, 1942, BAIM No.2:78. Type species (OD) *Hemifusus (Mayeria) goniodes* Suter, 1917. N.Z., Tertiary.
NOTOSCROBS Powell, 1927, TNZI 57:547. Type species (OD) *N.ornata* Powell, 1927. N.Z., Recent.
nukumaruensis, Neoguraleus Powell, 1942, BAIM No.2:134, p.5, fig.3. N.Z., Tertiary.
nummaria, Talabrica Powell, 1931, RAIM 1(2):109, pl.12, figs.19,20. N.Z., Tertiary.
nummaria, Zerotula Powell, 1940, TRSNZ 70:236, p..28, figs.14,15. N.Z., Recent.

nutans, Maoritomella Powell, 1944, RAIM 3(1):39, pl.2, fig.15. Sth. Australia, Tertiary.
nutans, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:140, pl.7, fig.3. N.Z., Tertiary.
oahuensis, Comitas Powell, 1969, IPM 2(10):270, pl.218. Hawaii, Recent.
oamarutica, Etremopsis Powell, 1942, BAIM No.2:154, pl.9, fig.2. N.Z., Tertiary.
obconica, Microvoluta Powell, 1952, RAIM 4(3):183, pl.36, fig.2. N.Z., Recent.
obesa, Hochstetteria Powell, 1958, BANZARE 6(9):174, pl.1, figs.5,6. Antarctica, Recent.
oblata, Lissotesta Powell, 1940, TRSNZ 70:221, pl.28, fig.13. N.Z., Recent.
obliquata, Austronoba Powell, 1940, TRSNZ 70:224, p.30, fig.1. N.Z., Recent.
obliquata, Benthocardiella Powell, 1930, TNZI 61:538, figs.4-6. N.Z., Recent.
obsoleta, Margarella (Promargarita) tropidaphoroides Powell, 1951, DR 26:99, pl.5, fig.4. Sth. Georgia, Recent.
obsoleta, Syntomodrillia Powell, 1944, RAIM 3(1):33, pl.2, fig.11. Victoria, Australia, Tertiary.
obtusispira, Dardanula Powell, 1955, CEB No.15:88, pl.3, fig.23. N.Z., Recent.
oconnori, Helicarion Powell, 1941, RAIM 2(5):263, pl.51, figs.3-5. N.Z., Recent.
oconnori, Paryphanta lignaria Powell, 1938, RAIM 2(3):134, pl.33, figs.3-6. N.Z., Recent.
oconnori, Phelussa Powell, 1941, RAIM 2(5):261, pl.51, figs.12,13. N.Z., Recent.
oconnori, Phrixgnathus Powell, 1941, RAIM 2(5):261, pl.51, fig.11. N.Z., Recent.
oconnori, Rhytida Powell, 1946, RAIM 3(2):130, pl.9, fig.10. N.Z., Tertiary.
octocarinatus, Trichosirius Powell, 1931, RCM 3:376, pl.51, fig.5. N.Z., Recent.
odhneri, Liracraea Powell, 1942, BAIM No.2:150, pl.5, fig.4. N.Z., Recent.
odhneri, Specula Powell, 1927, RCM 3(2):117, pl.21, fig.10. N.Z., Recent.
odhneri, Zeradina Powell, 1927, TNZI 58:297, pl.34, fig.1. N.Z., Recent.
oliveri, Austronoba Powell, 1927, TNZI 57:542, pl.27, fig.9. Kermadec Is, Recent.
oliveri, Cellana strigilis Powell, 1955, CEB No.15:73, pl.5, figs. 51-53. N.Z., Recent.
oliveri, Limatula Powell, 1958, RAIM 5(1/2):71, pl.9, fig.4. Kermadec Is, Recent.
oliveri, Subonoba Powell, 1955, CEB No.15:79, pl.2, fig.16. N.Z., Recent.
oneroaensis, Acteon Powell & Bartrum, 1929, TNZI 60:442, pl.45, figs.77-79. N.Z., Tertiary.
oneroaensis, Austrofusus (Neocola) Powell & Bartrum, 1929, TNZI 60:432, pl.35, figs.13,14. N.Z., Tertiary.
oneroaensis, Cardium Powell, 1938, TRSNZ 68:367, pl.38, figs.7,8. N.Z., Tertiary.
oneroaensis, Euspinacassis Powell, 1938, TRSNZ 68:374, pl.39, figs. 10,11. N.Z., Tertiary.
oneroaensis, Isognomon Powell & Bartrum, 1929, TNZI 60:400, pl.44, fig.69; pl.49, fig.106. N.Z., Tertiary.
oneroaensis, "Macoma" Powell & Bartrum, 1929, TNZI 60:404, pl.42, fig.62. N.Z., Tertiary.
oneroaensis, Polinices Powell & Bartrum, 1929, TNZI 60:425, pl.42, figs. 59-61, N.Z., Tertiary.
opposita, Etremopsis Powell, 1944, RAIM 3(1):55, pl.5, fig.7. Victoria, Australia, Tertiary.
OPTOTURRIS Powell, 1944, RAIM 3(1):12. Type species (OD) *Pleurotoma optata* Harris, 1897. Victoria, Australia, Tertiary.
opuraensis, Arca (Acar) Bartrum & Powell, 1928, TNZI 59:154, pl.26, fig.15, N.Z., Tertiary.
opuraensis, Crypta Bartrum & Powell, 1928, TNZI 59:145, pl.27. fig.25. N.Z., Tertiary.
opuraensis, Tugali Bartrum & Powell, 1928, TNZI 59:140, pl.27, fig.20. N.Z., Tertiary.
orbicula, Benthocardiella Powell, 1930, TNZI 61:538, figs.1-3. N.Z., Recent.
ormesi, Verconella Powell, 1927, TNZI 57:555, pl.29, figs.15-17. N.Z., Recent.
ornata, Liarea Powell, 1954, RAIM 4(5):282, pl.48, fig.37. N.Z., Recent.
ornata, Notoscrobs Powell, 1927, TNZI 57:548, pl.28, fig.19. N.Z., Recent.
oruaensis, Neoguraleus Powell, 1942, BAIM No.2:137, pl.6, fig.7. N.Z., Recent.
osbornei, Calliostoma Powell, 1926, TNZI 56:591, pl.103, figs.1,2. N.Z., Recent.
otagoensis, Antiguraleus Powell, 1942, BAIM No.2:147, pl.8, fig.4. N.Z., Recent.
otagoensis, Aoteadrillia Powell, 1942, BAIM No.2:89, pl.2, fig.8. N.Z., Recent.
otagoensis, Cabestana (Cymatilesta) Powell, 1954, RAIM 4(4):236, pl.39, fig.1. N.Z., Recent.
otagoensis, Cuna Powell, 1927, RCM 3(2):120, pl.23, figs.7,8. N.Z., Recent.
otagoensis, Eulima Powell, 1927, RCM 3(2):119, pl.21, fig.6. N.Z., Recent.
otagoensis, Euthrenopsis Powell, 1929, TNZI 60:89, pl.3, fig.57. N.Z., Recent.

otagoensis, Rhytida Powell, 1930, RAIM 1(1):32, textfigs.3,10-12. N.Z., Recent.
otagoensis, Splendrillia Powell, 1942, BAIM No.2:104, pl.2, fig.4. N.Z., Recent.
otakauica, Cominella (Eucominia) Powell, 1946, RAIM 3(2):143, pl.12, figs.5-7. N.Z., Recent.
otakauica, Liracraea Powell, 1942, BAIM No.2:149, pl.5, fig.5. N.Z., Recent.
otakia, Paryphanta traversi Powell, 1946, RAIM 3(2):121, pl.10, figs. 5,6. N.Z., Recent.
ovata, Scrobs Powell, 1927, TNZI 57:546, pl.28, fig.20. N.Z., Recent.
owengaensis, Munditia Powell, 1933, RAIM 1(4):195, pl.33, figs. 9,10. N.Z., Recent.
pagoda, Teretianax Powell, 1926, TNZI 56:596, fig.3. N.Z., Recent.
pagodula, Maoritomella Powell, 1942, BAIM No.2:115, pl.13, fig.9. N.Z., Tertiary.
pagodula, Waitara Powell, 1942, BAIM No.2:168, pl.14, fig.7. N.Z., Tertiary.
pahiensis, Notogenota Powell, 1942, BAIM No.2:79, textfig.D19. N.Z., Tertiary.
pakaurangia, Microdrillia Powell, 1942, BAIM No.2:117, pl.2, fig.9. N.Z., Tertiary.
palawanica, Comitas aequatorialis Powell, 1969, IPM 2(10):282, pl.225, figs.5,6. Philippines, Recent.
pallida, Dardanula Powell, 1937, DR 15:203, pl.53, fig.16. N.Z., Recent.
palmeri, Morula (Oppomorus) Powell, 1967, RAIM 6(3):193, pl.37, figs.10-13. N.Z., Recent.
palmeri, Proxicharonia Powell, 1967, RAIM 6(3):188, pl.36, figs.11,12. N.Z., Recent.
pandora, Placostylus (Maoristylus) ambagiosus Powell, 1951, RAIM 4(2):137, pl.28, fig.4.
PARACOMINIA Powell & Bartrum, 1929, TNZI 60:433. Type species (OD) *Cominella lignaria* Powell & Bartrum, 1929. N.Z., Tertiary.
PARACOMITAS Powell, 1942, BAIM No.2:61. Type species (OD) *Surcula castlecliffensis* Marshall & Murdoch, 1919. N.Z., Tertiary.
paradoxa, Cirsonella Powell, 1937, DR 15:183, pl.50, figs.15,16. N.Z., Recent.
paradoxa, Zaclys Powell, 1937, DR 15:205, pl.54, fig.1. N.Z., Recent.
paragenota, Leucosyrinx Powell, 1951, DR 26:169, pl.9, fig.56. Falkland Is, Recent.
PARAGURALEUS Powell, 1944, RAIM 3(1):49. Type species (OD) *P.balcombensis* Powell, 1944. Victoria, Australia, Tertiary.
PARAMENDAX Powell, 1937, DR 15:205. Type species (OD) *P.apicina* Powell, 1937. N.Z., Recent.
paraspiritus, Placostylus (Maoristylus) ambagiosus Powell, 1951, RAIM 4(2):137, pl.28, fig.7.
paratenoceras, Leucosyrinx Powell, 1951, DR 26:168, pl.9, fig.54. Sth. Shetland Is, Recent.
parcipictus, Micrelenchus Powell, 1946, RAIM 3(2):138, pl.11, fig.1. N.Z., Recent.
parengaensis, Lasaea Powell, 1935, PMSL 21(4):257, pl.28, fig.5. N.Z., Recent.
parri, Micantapex Powell, 1944, RAIM 3(1):15, pl.7, fig.2. Victoria, Australia, Tertiary.
partinoda, Mauidrillia Powell, 1944, RAIM 3(1):35, pl.4, fig.5. Victoria, Australia, Tertiary.
partula, Liarea turriculata Powell, 1954, RAIM 4(5):291, pl.48, fig.35. N.Z., Recent.
PARVAPLUSTRUM Powell, 1951, DR 26:180. Type species (OD) *P.tenerum* Powell, 1951. Falkland Is, Recent.
parvula, Aupouria Powell, 1937, DR 15:165, pl.45, fig.1. N.Z., Recent.
parvula, Cirsonella Powell, 1926, RCM 3(1):45, pl.5, figs.6,7. N.Z., Recent.
parvula, Subonoba Powell, 1931, RCm 3:375, pl.51, fig.7. N.Z., Recent.
patrickensis, Paryphanta rossiana Powell, 1949, RAIM 3(6):358, pl.65, figs.10-12. N.Z., Recent.
patulosa, Sigapatella Powell & Bartrum, 1929, TNZI 60:422, pl.40, fig.43. N.Z., Tertiary.
paucicostata, Stilla Powell, 1937, DR 15:218, pl.56, fig.11. N.Z., Recent.
paucicostata, Subonoba Powell, 1931, RCM 3:375, pl.51, fig.3. N.Z., Recent.
paucilamellatus, Trophon shackletoni Powell, 1951, DR 26:153, pl.9, fig.52. Sth. Georgia, Recent.
paucispiralis, Chlanidota Powell, 1951, DR 26:141, pl.8, figs.36,37. Sth. Georgia, Recent.
paucispiralis, Chlanidota Powell, 1951, DR 26:141, pl.8, figs.36,37. Sth. Georgia, Recent.
paucispiralis, Micantapex Powell, 1942, BAIM No.2:55, pl.13, fig.2. N.Z., Tertiary.
pauperata, Sinezona Powell, 1933, RAIM 1(4):193, pl.33, figs.4,5. N.Z., Recent.
paupereques, Merelina Powell, 1937, DR 15:193, pl.52, fig.10. N.Z., Recent.
paupereques, Pterochelus Powell, 1974, RAIM 11:199, figs.10,11. N.Z., Recent.

pectinifera, Therasia Powell, 1935, PMSL 21(4):245, pl.26, figs.3-5. N.Z., Recent.
pedicus, Antiguraleus Powell, 1942, BAIM No.2:148, pl.8, fig.5. N.Z., Recent.
PELLILACUNELLA Powell, 1951, DR 26:109. Type species (OD) *Pellilitorina bennetti* Preston, 1916. Sth. Shetlands, Recent.
pellucida, Haurakiopsis Powell, 1937, DR 15:192, pl.52, fig.5. N.Z., Recent.
penerectangularis, Venericardia Bartrum & Powell, 1928, TNZI 59:156, pl.26, figs.8,9. N.Z., Tertiary.
perampla, Rhytida meesoni Powell, 1946, RAIM 3(2):127, textfigs.D7-D9. N.Z., Recent.
peramplus, Zegalerus Powell & Bartrum, 1929, TNZI 60:422, pl.40, fig.45. N.Z., Tertiary.
perarmatus, Micantapex Powell, 1944, RAIM 3(1):14, pl.7, fig.1. Victoria, Australia, Tertiary.
percarinata, Paradmete Powell, 1951, DR 26:166, pl.9, fig.57. Sth. Shetland Is, Recent.
percarinata, Taranis Powell, 1967, IPM 1(7):427, pl.309, fig.6. Philippines, Recent.
peregrina, Tolema Powell, 1947, RAIM 3(3):171, pl.19, fig.3. N.Z., Recent.
personata, Awateria Powell, 1942, BAIM No.2:130, pl.11, fig.3. N.Z., Tertiary.
pervegrandis, Balcis Powell, 1940, TRSNZ 70:233, pl.31, fig.1. N.Z., Recent.
perversus, Prosipho Powell, 1951, DR 26:147, pl.6, fig.11. Sth. Georgia, Recent.
pfefferi, Brookula Powell, 1951, DR 26:104, pl.5, fig.8. Sth. Georgia, Recent.
philippinensis, Pinguigemmula Powell, 1964, IPM 1(5):278, pl.215, figs.5,6. Philippines, Recent.
PHOTINASTOMA Powell, 1951, DR 26:94. Type species (OD) *Trochus taeniatus* Wood, 1828. Falkland Is, Recent.
pileopsis, Lissarca Powell, 1927, RCM 3(2):120, pl.22, figs.3,4. N.Z., Recent.
pilosa, Chlanidota Powell, 1951, DR 26:139, pl.8, figs.29,30. Bouvet I, Recent.
pinguoides, Linemera Powell, 1940, TRSNZ 70:225, pl.30, fig.7. N.Z., Recent.
pisiformis, Cirsonella Powell, 1937, DR 15:184, pl.50, figs.13,14. N.Z., Recent.
platycephala, Baryspira Powell & Bartrum, 1929, TNZI 60:439, pl.36, figs.15-18. N.Z., Tertiary.
platycostatus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:140, pl.8, fig.9. N.Z., Tertiary.
pleurotomella, Cryptoborsonia Powell, 1944, RAIM 3(1):43, pl.1, fig.12. Victoria, Australia, Tertiary.
plicata, Glaphyrina Powell, 1929, TNZI 60:97, pl.4, figs.81,82. N.Z., Recent.
pliocenica, Zelandiella Powell, 1931, RAIM 1(2):102, pl.11, figs. 11,12. N.Z., Tertiary.
poirieria, Trophon Powell, 1951, DR 26:155, pl.9, fig.51. Antarctica, Recent.
porcellana, Margarella Powell, 1951, DR 26:98, pl.5, fig.2. Marion I, Recent.
porcellanoides, Notosetia Powell, 1937, DR 15:200, pl.53, fig.9. N.Z., Recent.
porrecta, Estea Powell, 1933, RAIM 1(4):201, pl.35, fig.8. N.Z., Recent.
porrectoides, Estea Powell, 1937, DR 15:197, pl.53, fig.1. N.Z., Recent.
porrectus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:142, pl.7, fig.11. N.Z., Tertiary.
precursor, Phenatoma Powell, 1942, BAIM No.2:109, pl.10, fig.8. N.Z., Tertiary.
prendrevillei, Scissurella Powell, 1933, RAIM 1(4):193, pl.33, fig.6. N.Z., Recent.
prestoni, Turridrupa Powell, 1967, IPM 1(7):423, pl.301, fig.4. Nom. subst. pro *Pleurotoma rimata* Preston, 1908. Andaman Is, Recent.
pricei, Cellana Powell, 1973, IPM 3(15):155, pl.128. W.Samoa, Recent.
prisca, Risellopsis Powell, 1935, RAIM 1(6):334, pl.78, figs.20-22. N.Z., Tertiary.
priscum, Bembicium Powell & Bartrum, 1929, TNZI 60:414, pl.35, figs.7,8. N.Z., Tertiary.
priscus, Placostylus ambagiosus Powell, 1938, RAIM 2(3):149, pl.34, figs.9,10. N.Z., Subrecent.
pritchardi, Apiotoma Powell, 1944, RAIM 3(1):20, pl.3, fig.7. Victoria, Australia, Tertiary.
proavitus, Micantapex Powell, 1942, BAIM No.2:54, pl.13, fig.4. N.Z., Tertiary.
problematica, Notoficula Powell, 1951, DR 26:137, pl.6, fig.18. Falkland Is, Recent.
problematicus, Pseudoinquisitor Powell, 1942, BAIM No.2:96, pl.3, fig.3. N.Z., Tertiary.
prognata, Puyseguria Powell, 1927, RCM 3(2):122, pl.23, fig.6. N.Z., Recent.

PROMERELINA Powell, 1926, TNZI 56:593. Type species (OD) *P.crosseaformis* Powell, 1926. N.Z., Recent.
propearabicula, Alcithoe Bartrum & Powell, 1928, TNZI 59:148, pl.30, fig.61. N.Z., Recent.
protensa, Ascitellina Powell, 1935, RAIM 1(6):333, pl.76, fig.8. N.Z., Tertiary.
protensum, Buccinulum (Evarnula) Powell, 1929, TNZI 60:74, pl.4, fig.67. N.Z., Tertiary.
prousei, Thalassohelix Powell, 1952, RAIM 4(3):164, textfigs.4-6,8,9. N.Z., Recent.
prouseorum, Paryphanta superba Powell, 1946, RAIM 3(2):109. N.Z., Recent.
PROXICHARONIA Powell, 1938, TRSNZ 68:373. Nom. subst. pro **CHARONIELLA** Powell & Bartrum, 1929. N.Z., Tertiary.
pseudanaloga, Puncturella Powell, 1957, BANZARE 6(7):140, pl.1, figs.1,2. Macquarie Is, Recent.
PSEUDEXOMILUS Powell, 1944, RAIM 3(1):61. Type of species (OD) *P.caelatus* Powell, 1944. Sth. Australia, Tertiary.
pseudoclarae, Comitas Powell, 1944, RAIM 3(1):18, pl.1, fig.6. Victoria, Australia, Tertiary.
pseudocollonia, Crosseola Powell, 1957, BANZARE 6(7):126, pl.1, fig.4. Kerguelen Is, Recent.
pseudodrillia, Cryptodaphne Powell, 1942, BAIM No.2:165, pl.4, fig.3. N.Z., Tertiary.
PSEUDOINQUISITOR Powell, 1942, BAIM No.2:96. Type species (OD) *P.problematicus* Powell, 1942. N.Z., Tertiary.
pseudomonilifera, Gemmula Powell, 1967, IPM 1(7):436, pl.312. Hawaiian Is, Recent.
pseudopareora, Aclis Powell, 1940, TRSNZ 70:236, pl.31, fig.6. N.Z., Recent.
pseudovermis, Struthiolaria Bartrum & Powell, 1928, TNZI 59:142, pl.30, figs.63,64. N.Z., Tertiary.
pukeuriensis, Maoritomella Powell, 1942, BAIM No.2:114, pl.4, fig.9. N.Z., Tertiary.
pulchra, Clavatoma Powell, 1942, BAIM No.2:107, pl.12, fig.8. N.Z., Tertiary.
pulchra, Fenestrodaphne Powell, 1944, RAIM 3(1):61, pl.6, fig.10. Sth. Australia, Tertiary.
pusilla, Benthocardiella Powell, 1930, TNZI 60:533, pl.60, figs.4,5. N.Z., Recent.
PUYSEGERIA Powell, 1927, RCM 3(2):122. Type species (OD) *P.cuneata* Powell, 1927. N.Z., Recent.
puysegurensis, Margarella Powell, 1939, RAIM 2(4):228, pl.49, fig.13. N.Z., Recent.
pycrofti, Rhytida Powell, 1932, RAIM 1(3):156, pl.28, fig.7, textfigs.1,2. N.Z., Recent.
pygmaeiformis, Marginella (Glabella) Powell, 1937, DR 15:216, pl.55, fig.3. N.Z., Recent.
quadricarinatus, Xenuroturris (Veruturris) Powell, 1944, RAIM 3(1):11, pl.1, fig.5. Victoria, Australia, Tertiary.
quadrispiralis, Etremopsis Powell, 1942, BAIM No.2:154, pl.9, fig.1. N.Z., Tertiary.
queenslandica, Leucosyrinx Powell, 1969, IPM 2(10):338, pl.258, figs.1,2. Queensland, Australia, Recent.
radiapex, Syngenochilus Powell, 1944, RAIM 3(1):66, pl;.6, fig.4. Victoria, Australia, Tertiary.
rakiura, Benthocardiella Powell, 1939, RAIM 2(4):223, pl.48, fig.6. N.Z., Recent.
rakiura, Fectola (Subfectola) Powell, 1939, RAIM 2(4):238, textfigs.a-c. N.Z., Recent.
rakiura, Kidderia Powell, 1939, RAIM 2(4):223, pl.48, fig.1. N.Z., Recent.
rakiura, Zemysia Powell, 1939, RAIM 2(4):224, textfigs.d,e. N.Z., Recent.
ramosa, Zerotula Powell, 1940, TRSNZ 70:237, pl.29, fig.3. N.Z., Recent.
RANGITOTOA Powell, 1933, TNZI 63:148. Type species (OD) *R.insularis* Powell, 1933. N.Z., Recent.
raoulensis, Austroneaera Powell, 1958, RAIM 5(1/2):78, pl.9, fig.9. Kermadec Is, Recent.
raoulensis, Baryspira (Spinaspira) Powell, 1967, RAIM 6(3):198, pl.38, figs.4,5. Kermadec Is, Recent.
raoulensis, Conus (Kermasprella) Powell, 1958, RAIM 5(1/2):83, pl.9, fig.1. Kermadec Is, Recent.
raoulensis, Pecten Powell, 1958, RAIM 5(1/2):67, pl.10, figs.1,2. Kermadec Is, Recent.
raricostatus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:141, pl.8, fig.8. N.Z., Tertiary.

regia, Aulacomya ater Powell, 1957, BANZARE 6(7):120, pl.2, figs.1,2. Kerguelen Is, Recent.
regia, Paralaoma Powell, 1948, RAIM 3(4/5):279, p.53, fig.2. N.Z., Recent.
REGIDRILLIA Powell, 1942, BAIM No.2:98. Type species (OD) *Austrodrillia (Regidrillia) sola* Powell, 1942. N.Z., Recent.
regis, Mitrithara Powell, 1937, DR 15:218, pl.56, fig.10. N.Z., Recent.
regis, Nobolira Powell, 1940, TRSNZ 70:226, pl.30, fig.4. N.Z., Recent.
regis, Zemitrella Powell, 1940, TRSNZ 70:240, pl.32, fig.1. N.Z., Recent.
regularis, Escalima Powell, 1955, CEB No.15:27. N.Z., Recent.
reinga, Venericardia Powell, 1933, PMSL 20(4):202, pl.17, figs. 1,2,5. N.Z., Recent.
rekohuana, Estea Powell, 1933, RAIM 1(4):199, pl.35, fig.9. N.Z., Recent.
remota, Spirotropis Powell, 1958, BANZARE 6(9):204, pl.2, fig.5. Antarctica, Recent.
retiaria, Cratis Powell, 1937, DR 15:166, pl.45, fig.4. N.Z., Recent.
retusa, Notosetia Powell, 1927, RCM 3(2):117, pl.21, fig.3. N.Z., Recent.
reversa, Prosipho Powell, 1958, BANZARE 6(9):197, pl.2, fig.6. Antarctica, Recent.
RHYTIDAREX Powell, 1948, RAIM 3(4/5):281. Type species (OD) *Rhytida (Rhytidarex) johnsoni* Powell, 1948. N.Z., Recent.
richardsoni, Paryphanta superba Powell, 1946, RAIM 3(2):110, textfig. A3. N.Z., Recent.
rigidum, Buccinulum (Evarnula) Powell, 1929, TNZI 60:73, pl.4, fig.64. N.Z. Tertiary.
rigidus, Neoguraelus (Fusiguraleus) Powell, 1942, BAIM No.2:142, pl.7, fig.6. N.Z., Tertiary.
rissoaformis, Lissotesta Powell, 1931, RCM 3:373, pl.52, fig.11. N.Z., Recent.
rissoaformis, Zelaxitas Powell, 1939, RAIM 2(4):230, pl.49, fig.5. N.Z., Recent.
robusta, Maoritomella Powell, 1942, BAIM No.2:115, pl.13, fig.8. N.Z., Tertiary.
robustum, Buccinulum (Euthrena) Powell, 1929, TNZI 60:88, pl.1, figs.19,20. N.Z., Recent.
rosa, Tawera Powell, 1955, CEB No.15:41, pl.5, figs.41,42, N.Z., Recent.
roseospira, Dardanula Powell, 1937, DR 15:203, pl.53, fig.13. N.Z., Recent.
rossiana, Paryphanta Powell, 1930, RAIM 1(1):44, pl.4, figs.4-6. N.Z., Recent.
rossianus, Antiguraleus Powell, 1942, BAIM No.2:148, pl.8, fig.3. N.Z., Recent.
rotella, Argalista Powell, 1937, DR 15:187, pl.50, figs.18,19. N.Z., Recent.
rotella, Paryphanta unicolorata Powell, 1938, RAIM 2(3):137, pl.33, figs.8,9. N.Z., Recent.
rotuloides, Liotella Powell, 1937, DR 15:182, pl.51, fig.8. N.Z., Recent.
rotunda, Pachykellya Powell, 1927, RCM 3(2):121, pl.23, fig.4. N.Z., Recent.
rotunda, Verconella dilatata Powell, 1927, TNZI 57:554, pl.29, figs. 11,12. N.Z., Recent.
ruforadiata, Paryphanta lignaria Powell, 1949, RAIM 3(6):353, pl.64, figs.1,2. N.Z., Recent.
rugobela, Cryptoborsonia Powell, 1944, RAIM 3(1):43, pl.1, fig.13. Victoria, Australia, Tertiary.
rugulosa, Scrobs (Nannoscrobs) Powell, 1930, TNZI 61:542, pl.88, fig.19. N.Z., Recent.
sandersonae, Acar Powell, 1933, PMSL 20(4):200, pl.17, figs.6-8. N.Z., Recent.
sandersonae, Neoguraleus Powell, 1942, BAIM No.2:136, pl.6, fig.5. N.Z., Recent.
scabriculus, Pseudoinquisitor Powell, 1944, RAIM 3(1):29, pl.3, fig.2. Victoria, Australia, Tertiary.
scalarina, Zeradina (Radinistra) Powell, 1940, TRSNZ 70:229, pl.31, fig.9. N.Z., Recent.
SCALARONOBA Powell, 1927, RCM 3(2):116. Type species (OD) *S.costata* Powell, 1927. N.Z., Recent.
scaphandroides, Kaitoa Powell, 1951, DR 26:179, pl.10, figs.69,70. Sth. Georgia, Recent.
schencki, Austronucula Powell, 1939, RAIM 2(4):220, pl.48, fig.5. N.Z., Recent.
scoresbyana, Miomelon Powell, 1951, DR 26:163, pl.9, fig.43. Falkland Is, Recent.
scotiana, Sinuber sculpta Powell, 1951, DR 26:120, pl.5, fig.10. Sth. Georgia, Recent.
scotianus, Trophon Powell, 1951, DR 26:153, pl.9, figs.48,49. Sth. Georgia, Recent.
secta, Mauidrillia Powell, 1944, RAIM 3(1):37, pl.4, fig.10. Sth. Australia, Tertiary.
secunda, Austrodrillia (Regidrillia) Powell, 1965, RAIM 6(2):166, pl.22, fig.7. N.Z., Recent.
secunda, Larochea Powell, 1937, DR 15:207, pl.50, fig.7. N.Z., Recent.
secunda, Maorimorpha Powell, 1942, BAIM No.2:126, pl.5, fig.1. N.Z., Recent.
secunda, Scalaronoba Powell, 1940, TRSNZ 70:227, pl.30, fig.10. N.Z., Recent.
secunda, Venustilifer Powell, 1940, TRSNZ 70:235, pl.29, fig.6. N.Z., Recent.

secundum, Coenaculum Powell, 1937, DR 15:198, pl.52, fig.13. N.Z., Recent.
secundus, Venustatrochus Powell, 1958, BANZARE 6(9):181, pl.2, fig.3. Antarctica, Recent.
segregata, Cabestana waterhousei Powell, 1933, TNZI 63:156, pl.23, fig.3. N.Z., Recent.
SEMELOIDEA Bartrum & Powell, 1928, TNZI 59:158. Type species (OD) *S.donaciformis* Bartrum & Powell, 1928. N.Z., Tertiary.
semilirata, Cosmasyrinx Powell, 1942, BAIM No.2:70, pl.14, fig.9. N.Z., Tertiary.
semiplana, Coronasyrinx Powell, 1944, RAIM 3(1):22, pl.1, fig.2. Sth. Australia, Tertiary.
semiplicata, Estea Powell, 1927, TNZI 57:543, pl.28, fig.17. N.Z., Recent.
semipolita, Cochlespira pulchella Powell, 1969, IPM 2(10):398, pl.309. Philippines, Recent.
senecta, Talabrica Powell, 1931, RAIM 1(2):109, pl.12, figs.23,24. N.Z., Tertiary.
senta, Marshallaria Powell, 1942, BAIM No.2:81, pl.14, fig.3. N.Z., Tertiary.
sepelibilis, "Guraleus" Powell & Bartrum, 1929, TNZI 60:441, pl.41, figs.55-58. N.Z., Tertiary.
sericea, Laomarex Powell, 1948, RAIM 3(4/5):279, pl.54, fig.1. N.Z., Recent.
sericea, Zemitrella Powell, 1937, DR 15:212, pl.56, fig.3. N.Z., Recent.
serratocostata, Cosa Powell, 1933, PMSL 20(4):201, pl.18, figs.1,2. N.Z., Recent.
serrulata, Mauidrillia Powell, 1944, RAIM 3(1):36, pl.4, fig.8. Victoria, Australia, Tertiary.
SIBOGASYRINX Powell, 1969, IPM 2(10):343. Type species (OD) *Leucosyrinx pyramidalis* Schepman, 1913. Indonesia, Recent.
sibukoensis, Apiotoma tibiaformis Powell, 1969, IPM 2(10):347, pl.265, figs.7.8, Indonesia, Recent.
sibukoensis, Gemmula Powell, 1964, IPM 1(5):258, pl.196, figs.8,9. Indonesia, Recent.
signeyana, Chlanidota Powell, 1951, DR 26:141, pl.8, figs.34,35. Sth. Orkneys, Recent.
simillima, Cochlespira Powell, 1969, IPM 2(10):403, pl.314, fig.3. Philippines, Recent.
simplex, Cirsonella Powell, 1937, DR 15:185, pl.50, fig.12. N.Z., Recent.
simplex, Lironoba Powell, 1927, RCM 3(2):116, pl.21, fig.4. N.Z., Recent.
simplex, Tahudrillia Powell, 1942, BAIM No.2:99, pl.4, fig..4. N.Z., Tertiary.
simplex, Tromina Powell, 1951, DR 26:136, pl.6, fig.15. Falkland Is, Recent.
singletoni, Guraleus Powell, 1944, RAIM 3(1):48, pl.6, fig.14. Victoria, Australia, Tertiary.
sinuata, Liratilia, Powell, 1937, DR 15:214, pl.56, fig.2. N.Z., Recent.
SINUBER Powell, 1951, DR 26:120. Type species (OD) *Natica sculpta* von Martens, 1878. Kerguelen Is, Recent.
sinusigera, Puha Powell, 1942, BAIM No.2:164, pl.4, fig.8. N.Z., Tertiary.
smithae, Panopea Powell, 1950, RAIM 4(1):78, pl.7, fig.5. N.Z., Recent.
smithi, Chlanidota Powell, 1958, BANZARE 6(9):192, pl.3, fig.3. Antarctica, Recent.
smithi, Pachymelon (Palomelon) Powell, 1950, RAIM 4(1):81, pl.7, figs.1,2. N.Z., Recent.
sola, Austrodrillia (Regidrillia) Powell, 1942, BAIM No.2:99, pl.10, fig.4. N.Z., Recent.
sola, Heteroturris Powell, 1967, IPM 1(7):411, pl.298. Philippines, Recent.
sola, Maoritomella Powell, 1942, BAIM No.2:114, pl.4, fig.11. N.Z., Tertiary.
SOLARIELLINAE Powell, 1951, DR 26:102. Type genus **SOLARIELLA** S.V. Wood, 1842.
solitaria, Eurytellina Powell, 1931, RAIM 1(2):95, pl.14, fig.40. N.Z., Tertiary.
solitaria, Murdochia Powell, 1935, PMSL 21(4):244, pl.26, figs.1,2. N.Z., Recent.
sorenseni, Flammulina Powell, 1955, CEB No.15:122, pl.4, figs. 38,39. N.Z., Recent.
sorenseni, Notosetia Powell, 1955, CEB No.15:87, pl.3, fig.20. N.Z., Recent.
sorenseni, Paxula Powell, 1955, CEB No.15:109, pl.1, fig.6.N.Z., Recent.
sorenseni, Pseudaneitea Powell, 1955, CEB No.15:128, pl.4, fig.40. N.Z., Recent.
sorenseni, Subonoba Powell, 1955, CEB No.15:76, pl.2, fig.11. N.Z., Recent.
sorenseni, Trachycardium (Vasticardium) Powell, 1958, RAIM 5(1/2):76, pl.11, figs.6,7. Kermadec Is, Recent.
spectabilis, Coluzea Powell, 1931, RAIM 1(2):105, pl.10, figs.1,2. N.Z., Tertiary.
spectabilis, Egustula Powell, 1928, TNZI 59:366, pl.54, figs.3,4. N.Z., Recent.
spedeni, Paryphanta Powell, 1932, RAIM 1(3):159, pl.28, figs.3-5. N.Z., Recent.
SPEIGHTIIDAE Powell, 1942, BAIM No.2:166. Type genus **SPEIGHTIA** Finlay, 1926.
spelaea, Cavellia Powell, 1928, TNZI 59:366, pl.55, fig.6, N.Z., Subrecent.
spelaea, Rhytida Powell, 1933, PMSL 20(4):192, textfigs.1-3. N.Z., Subrecent.

spiritus, Allodiscus Powell, 1952, RAIM 4(3):164, textfig.3. N.Z., Recent.
spiritus, Placostylus (Maoristylus) ambagiosus Powell, 1947, RAIM 3(3):185, pl.21, figs.7-9. N.Z., Subrecent.
squadronensis, Venericardia (Megacardita) Powell, 1938, TRSNZ 68:367, pl.38, fig.10. N.Z., Tertiary.
squalidum, Buccinulum (Evarnula) Powell, 1929, TNZI 60:79, pl.2, figs.43,44. N.Z., Recent.
stephenensis, Rhytida Powell, 1930, RAIM 1(1):30, pl.4, fig.8. N.Z., Recent.
stevensoni, Scintilla Powell, 1932, PMSL 20(1):65, pl.6, fig.2. N.Z., Recent.
stewartiana, Kerguelenia Powell, 1939, RAIM 2(4):237, pl.49, figs. 6,7. N.Z., Recent.
stewartiana, Lissarca Powell, 1935, PMSL 21(4):255, pl.28, fig.3. N.Z., Recent.
stewartiana, Tugali Powell, 1939, RAIM 2(4):227, pl.50, figs.7-9. N.Z., Recent.
stewartianum, Buccinulum (Evarnula) marwicki Powell, 1929, TNZI 60:80, pl.2, fig.38. N.Z., Recent.
STRAMONITROPHON Powell, 1951, DR 26:156. Type species (OD) *Trophon laciniatus* Martyn, 1789. Strait of Magellan, Recent.
strebeli, Brookula Powell, 1951, DR 26:104, pl.5, fig.7. Sth. Georgia, Recent.
strebeli, Typhlodaphne Powell, 1951, DR 26:174, pl.9, fig.53. Cape Horn, Recent.
STRIATESTEA Powell, 1927, TNZI 57:544. Type species (OD) *S.bountyensis* Powell, 1927. N.Z., Recent.
striatula, Benthocardiella Powell, 1931, RCM 3:371, pl.51, fig.1. N.Z., Recent.
striatus, Epigrus Powell, 1927, TNZI 57:545, pl.28, fig.16. N.Z., Recent.
subamoena, Marginella (Serrata) Powell, 1937, DR 15:216, pl.55, fig.6. N.Z., Recent.
subantarctica, Libracraea Powell, 1942, BAIM No.2:149, pl.5, fig.6. N.Z., Recent.
subantarctica, Zeadmete Powell, 1933, PMSL 20(5):236, pl.20, fig.7. N.Z., Recent.
subariel, Phrixgnathus Powell, 1948, RAIM 3(4/5):278, pl.54, fig.4. N.Z., Recent.
subcarinapex, Comitas (Carinacomitas) Powell, 1942, BAIM No.2:60, pl.10, fig.5. N.Z., Tertiary.
subcarinata, Notosetia Powell, 1940, TRSNZ 70:228, pl.30, fig.11. N.Z., Recent.
subcompressa, Tectisumen Powell, 1937, DR 15:188, pl.49, figs.4,5. N.Z., Recent.
SUBFECTOLA Powell, 1939, RAIM 2(4):238. Type species (OD) *Helix caputspinulae* Reeve, 1852. Australasia, Recent.
subfusca, Paryphanta gilliesi Powell, 1930, RAIM 1(1):47, pl.5, figs.6,7. N.Z., Recent.
subfusula, Marginella (Serrata) Powell, 1932, TNZI 62:210, pl.33, figs.3,4. N.Z., Recent.
subgradata, Notosetia Powell, 1937, DR 15:199, pl.53, fig.10. N.Z., Recent.
sublaevigatum, Notolepton Powell, 1937, DR 15:171, pl.47, fig.7. N.Z., Recent.
subnodosa, Liratilia Powell, 1934, TRSNZ 64:158, pl.21, figs.4,5. N.Z., Recent.
subobliquum, Notolepton Powell, 1937, DR 15:172, pl.47, fig.6. N.Z., Recent.
subobsoletus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2:143, pl.7, fig.1. N.Z., Tertiary.
subrufa, Estea Powell, 1937, DR 15:197, pl.53, fig.2. N.Z., Recent.
subrugata, Pyagulina Powell, 1927, RCM 3(2):118, pl.22, fig.6. N.Z., Recent.
substriata, Perrierina Powell, 1935, PMSL 21(4):255, pl.28, fig.1. N.Z., Recent.
subtenuis, Notosetia Powell, 1937, DR 15:200, pl.53, fig.8. N.Z., Recent.
subtilissima, Pervicacia Bartrum & Powell, 1928, TNZI 59:151, pl.28, figs.38,39. N.Z., Tertiary.
subtriquetra, Macoma Bartrum & Powell, 1928, TNZI 59:157, pl.25, figs.1,2. N.Z., Tertiary.
subtropicalis, Bulla (Quibulla) Powell, 1965, RAIM 6(2):167, pl.22, figs.8,9. Norfolk I, Recent.
subtruncatus, Antiguraleus Powell, 1942, BAIM No.2:147, pl.8, fig.1. N.Z., Recent.
subvaricosa, Sigapatella Powell & Bartrum, 1929, TNZI 60:423, pl.40, fig.44, N.Z., Tertiary.
succineaformis, Toledonia Powell, 1955, CEB No.15:114, pl.3, fig.30. N.Z., Recent.
suluensis, Comitas Powell, 1969, IPM 2(10):280, pl.223, fig.7. Philippines, Recent.
superba, Merelina Powell, 1927, TNZI 57:536, pl.26, fig.2. N.Z., Recent.
superba, Paryphanta Powell, 1930, RAIM 1(1):41, pl.4, fig.3; pl.3. N.Z., Recent.
superba, Tugali Powell, 1934, RAIM 1(5):265, pl.58, figs.10,11. N.Z., Tertiary.

supralaevis, Mauidrillia Powell, 1942, BAIM No.2:86, pl.1, fig.7. N.Z., Tertiary.
suteri, Buccinulum (Euthrena) Powell, 1934, TRSNZ 64:156, pl.21, fig.6. N.Z., Recent.
suteri, Turbonilla Powell, 1926, RCM 3(1):47, pl.5, figs.4,5. N.Z., Recent.
sutherlandica, Mitrithara Powell, 1942, BAIM No.2:123, pl.4, fig.5. N.Z., Tertiary.
sutherlandicus, Neoguraleus (Fusiguraleus) Powell, 1942, BAIM No.2: 144, pl.9, fig.11. N.Z., Tertiary.
SYNGENOCHILUS Powell, 1944, RAIM 3(1):66. Type species (OD) *S.radiapex* Powell, 1944. Victoria, Australia, Tertiary.
taberna, Cellana Powell, 1973, IPM 3(15):190, pl.172, fig.2. N.Z., Tertiary.
TAGUAHELIX Powell, 1955, CEB No.15:125. Type species (OD) *Thermia expeditionis* Suter, 1909 (= *Helix campbellica* Filhol, 1880). Auckland Is, Recent.
TAHUDRILLIA Powell, 1942, BAIM No.2:99. Type species (OD) *T.simplex* Powell, 1942. N.Z., Tertiary.
tahuia, Eoscobinella Powell, 1942, BAIM No.2:122, pl.4, fig.1, N.Z., Tertiary.
TAHUNANUIA Powell, 1952, RAIM 4(3):170. Type species (OD) *T.alata* Powell, 1952. N.Z., Recent.
TAHUSYRINX Powell, 1942, BAIM No.2:86. Type species (OD) *Parasyrinx finlayi* Allan, 1926. N.Z., Tertiary.
taiaroa, Chlamys (Mimachlamys) Powell, 1952, RAIM 4(3):169, pl.35, fig.1. N.Z., Recent.
taieriensis, Rochefortula Powell, 1939, RAIM 2(4):226, pl.48, fig.3. N.Z., Recent.
tani, Puyseguria Powell, 1939, RAIM 2(4):225, pl.48, fig.2. N.Z., Recent.
tara, Liarea aupouria Powell, 1954, RAIM 4(5):287, pl.48, fig.34. N.Z., Recent.
tarangaensis, Rhytida Powell, 1930, RAIM 1(1):31, textfigs.3,6. N.Z., Recent.
tararuaensis, Paryphanta traversi Powell, 1938, RAIM 2(3):138, pl.33, fig.2. N.Z., Recent.
tasmanica, Willungia Powell, 1938, TRSNZ 68:370, pl.39, fig.4. Tasmania, Australia, Tertiary.
tatei, Borsonia Powell, 1944, RAIM 3(1):42, pl.3, fig.8. Victoria, Australia, Tertiary.
taupoensis, Merelina Powell, 1939, RAIM 2(4):232, pl.49, fig.3. N.Z., Recent.
tawhitirahia, Polinices Powell, 1965, RAIM 6(2):163, pl.22, figs.1-3. N.Z., Recent.
taylori, Myrtea (Lucinoma) Powell, 1935, RAIM 1(6):331, pl.76, fig.3. N.Z., Tertiary.
tenebrosus, Guraleus Powell, 1926, PMSL 17(1):37. textfig. N.Z., Recent.
tenella, Dardanula Powell, 1937, DR 15:203, pl.53, fig.15. N.Z., Recent.
tenellula, Nuculana Bartrum & Powell, 1928, TNZI 59:153, pl.25, figs.3-5. N.Z., Tertiary.
tenerum, Parvaplustrum Powell, 1951, DR 26:180, pl.7, fig.25. Falkland Is, Recent.
tenuilirata, Lissotesta Powell, 1931, RCM 3:373, pl.52, figs.9,10. N.Z., Recent.
tenuis, Pronucula Powell, 1927, RCM 3(2):119, pl.22, figs.1,2. N.Z., Recent.
tenuisculpta, Notosetia Powell, 1933, RCM 4:37, pl.6, fig.7. N.Z., Recent.
tenuistriata, Subonoba Powell, 1933, PMSL 20(5):235, textfig.4. N.Z., Recent.
tenuistriatum, Buccinulum (Buccinulum) Powell, 1929, TNZI 60:71, pl.1, figs.1,2. N.Z., Recent.
tepikiensis, Murexsul Powell, 1934, RAIM 1(5):272, pl.59, figs.14,15. N.Z., Tertiary.
tepikiensis, Notosinister Powell, 1934, RAIM 1(5):265, pl.57, fig.4. N.Z., Tertiary.
tepikiensis, Syrnola Powell, 1934, RAIM 1(5):266, pl.57, fig.3. N.Z., Tertiary.
terebra, Icuncula Powell, 1930, TNZI 60:538, pl.60, fig.8. N.Z., Recent.
teres, Austroclavus Powell, 1944, RAIM 3(1):40, pl.2, fig.3. Victoria, Australia, Tertiary.
teschi, Ptychosyrinx timorensis Powell, 1964, IPM 1(5):291, pl.223, figs.5,6. Indonesia. Recent.
tessellata, Allodiscus Powell, 1941, RAIM 2(5):262, pl.51, figs.1,2. N.Z., Recent.
tessellata, Gemmula Powell, 1967, IPM 1(7):439, pl.315. Hawaiian Is, Recent.
tessellata, Liarea egea Powell, 1954, RAIM 4(5):286, pl.44, fig.5; pl.47, figs.24-26. N.Z., Recent.
tetleyi, Buccinulum (Evarnula) Powell & Bartrum, 1929, TNZI 60:431, pl.47, figs.93,94. N.Z., Tertiary.
tetleyi, Cymatium Powell & Bartrum, 1929, TNZI 60:425, pl.46, figs. 87,88. N.Z., Tertiary.

tetleyi, Mytilus Powell & Bartrum, 1929, TNZI 60:399, pl.40, figs. 46,47; pl.49, fig.103. N.Z., Tertiary.
tetleyi, Turritella (Zeacolpus) Powell & Bartrum, 1929, TNZI 60:420, pl.36, figs.21,22. N.Z., Tertiary.
textilis, Parachiton Powell, 1937, DR 15:219, pl.48, figs.4-6. N.Z., Recent.
THATCHERIASYRINX Powell, 1969, IPM 2(10):405. Type species (OD) *Ancistrosyrinx orientis* Melvill, 1904. Gulf of Oman, Recent.
THATCHERIIDAE Powell, 1942, BAIM No.2:167. Type genus **THATCHERIA** Angas, 1877. Japan, Recent.
THERASIELLA Powell, 1948, RAIM 3(4/5):276. Type species (OD) *Nanina* (?) *celinde* Gray, 1850. N.Z., Recent.
thielei, Bathydomus Powell, 1958, BANZARE 6(9):194, pl.3, fig.8. Antarctica, Recent.
thielei, Belalora Powell, 1951, DR 26:172, pl.6, fig.20. Falkland Is, Recent.
thielei, Chlanificula Powell, 1958, BANZARE 6(9):193, pl.3, fig.2. Antarctica, Recent.
thielei, Cyclopecten Powell, 1958, BANZARE 6(9):176, pl.1, figs.1,2. Antarctica, Recent.
thielei, Leptocollonia Powell, 1951, DR 26:105, pl.5, fig.9. Sth. Georgia, Recent.
thielei, Turritellopsis Powell, 1951, DR 26:112, pl.7, fig.26. Antarctica, Recent.
thomsoni, Aoteadrillia Powell, 1942, BAIM No.2:90, pl.2, fig.7. N.Z., Tertiary.
thomsoni, Awateria Powell, 1942, BAIM No.2:130, pl.11, fig.1. N.Z., Tertiary.
thomsoni, Cellana Powell & Bartrum, 1929, TNZI 60:413, pl.35, fig.12. N.Z., Tertiary.
thomsoni, Scrinium Powell, 1942, BAIM No.2:127, pl.11, fig.8. N.Z., Tertiary.
tibiaformis, Apiotoma Powell, 1969, IPM 2(10):347, pl.265, figs. 5,6. Philippines, Recent.
ticaonica, Taranis Powell, 1967, IPM 1(7):427, pl.309, fig.2. Philippines, Recent.
tomlini, Cymatona Powell, 1955, CEB No.15:97. Nom. subst. pro *Nassaria kampyla* Tomlin, 1948, N.Z., Recent.
tomlini, Prosipho Powell, 1957, BANZARE 6(7):142, pl.1, fig.5. Macquarie I, Recent.
tomopleuroides, Xenuroturris (Veruturris) Powell, 1944, RAIM 3 (1):11, pl.1, fig.3. Victoria, Australia, Tertiary.
toreuma, Larochella Powell, 1927, TNZI 57:540, pl.26, fig.4. N.Z., Recent.
toreuma, Orbitestella Powell, 1930, TNZI 61:542, pl.88, figs.16,17. N.Z., Recent.
toreuma, Xenophalium Powell, 1928, TNZI 59:636, pl.76, figs.33,34. N.Z., Tertiary.
torquayensis, Borsonia Powell, 1944, RAIM 3(1):42, pl.1, fig.11. Victoria, Australia, Tertiary.
torquayensis, Comitas Powell, 1944, RAIM 3(1):17, pl.3, fig.9. Victoria, Australia, Tertiary.
torquayensis, Mauidrillia Powell, 1944, RAIM 3(1):35, pl.4, fig.7. Victoria, Australia, Tertiary.
trailli, Scrobs Powell, 1939, RAIM 2(4):233, pl.49, fig..4. N.Z., Recent.
trapezoidalis, Lutraria Powell & Bartrum, 1929, TNZI 60:406, pl.46, figs.89,90. N.Z., Tertiary.
traversi, Paryphanta Powell, 1930, RAIM 1(1):50, pl.5, figs.1,2. N.Z., Recent.
triangulata, Zerotula Powell, 1937, DR 15:209, pl.54, figs.15,16. N.Z., Recent.
tricarinata, Promerelina Powell, 1937, DR 15:195, pl.52, fig.11. N.Z., Recent.
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vera, Nepotilla Powell, 1940, TRSNZ 70:246, pl.32, fig.10. N.Z., Recent.
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vitiensis, Cellana Powell, 1973, IPM 3(15):158, pl.129, figs.1,2. Nom. subst. pro *Patella sagittata* Gould, 1846. Fiji Is., Recent.
vivens, Anticomitas Powell, 1942, BAIM No.2:61, pl.10, fig.11. N.Z., Recent.
vivens, Antizafra Powell, 1934, TRSNZ 64:159, pl.22, figs.7,8. N.Z., Recent.
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waiauensis, Syntomodrillia Powell, 1942, BAIM No.2:105, pl.2, fig.6. N.Z., Tertiary.
waiauensis, Tomopleura Powell, 1942, BAIM No.2:112, pl.12, fig.12. N.Z., Tertiary.
waihoensis, Inquisitor Powell, 1942, BAIM No.2:95, pl.3, fig.2. N.Z., Tertiary.
waihiana, Nuculana (Saccella) Powell, 1931 1(2):91, pl.11, fig.15. N.Z., Tertiary.
waihuaensis, Aoteadrillia Powell, 1942, BAIM No.2:91, pl.12, fig.14. N.Z., Tertiary.
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waikukuensis, Cirsonella Powell, 1937, DR 15:184, pl.50, figs.10,11. N.Z., Recent.
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waitemataensis, Magnatica (Spelaenacca) Powell, 1938, TRSNZ 68:369, pl.39, fig.3. N.Z., Tertiary.
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waitemataensis, Pyrazus Powell & Bartrum, 1929, TNZI 60:418, pl.37, fig.34 N.Z., Tertiary.
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waitotarana, Pholadomya Powell, 1931. RAIM 1(2):96, pl.11, fig.16. N.Z., Tertiary.
wanganuica, Panopea Powell, 1950, RAIM 4(1):80, pl.7, fig.6. N.Z., Tertiary.
wanganuica, Puyseguria Powell, 1931, RAIM 1(2):110, pl.14, fig.39. N.Z., Tertiary.
waganuiense, Xenophalium Powell, 1928, TNZI 59:637, pl.76, fig.36. N.Z., Tertiary.

watti, Paryphanta Powell, 1946, RAIM 3(2):101, pl.9, fig.2, textfig.A5. N.Z., Recent.
watti, Placostylus (Maoristylus) ambagiosus Powell, 1947, RAIM 3(3):187, pl.22, figs.10-13. N.Z., Recent.
weaveri, Turridrupa Powell, 1967, IPM 1(7):423, pl.303, fig.5. Hawaiian Is, Recent.
webbi, Rhytida greenwoodi Powell, 1949, RAIM 3(6):361, pl.65, figs.16.17. N.Z., Recent.
websteri, Notoplax Powell, 1937, DR 15:220, pl.48, figs.2,3. N.Z., Recent.
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whareana, Placostylus (Maoristylus) ambagiosus Powell, 1951, RAIM 4(2):135, pl.28, fig.2. N.Z., Recent.
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worleyi, Aeschrodomus Powell, 1928, TNZI 59:365, pl.54, fig.2. N.Z., Recent.
*wormaldi, Columbarium (Coluzea)*Powell, 1971, RAIM 8:221, fig.17. N.Z., Recent.
wormaldi, Latiaxis Powell, 1971, RAIM 8:220, figs.15,16. N.Z., Recent.
wormaldi, Marginella (Volvarina) Powell, 1971, RAIM 8:223, fig.25. N.Z., Recent.
worthyae, Schizoglossa Powell, 1949, RAIM 3(6):366, pl.65, fig.15. N.Z., Recent.
worthyae, Verconella adusta Powell, 1947, RAIM 3(3):167, pl.17, fig.2. N.Z., Recent.
worthyi, Placostylus (Maoristylus) ambagiosus Powell, 1947, RAIM 3(3):183, pl.20, figs.7-9, N.Z. Subrecent.
wyattae, Sabia Powell, 1958, RAIM 5(1):90, pl.12, figs.3,4. N.Z., Recent.
XYMENOPSIS Powell, 1951, DR 26:158. Type species (OD) *Fusus liratus* Gould, 1849. Patagonia, Recent.
youngi, Cominella (Cominula) Powell, 1940, TRSNZ 70:239, pl.33, figs.9,10. N.Z., Recent.
youngi, Maoricrypta Powell, 1940, TRSNZ 70:232, pl.33, figs.12,13. N.Z., Recent.
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NON-MOLLUSCAN TAXA

CRUSTACEA

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maorianus, Ctenocheles Powell, 1949, RAIM 3(6):369, pl.68, figs.3-7. N.Z., Recent.

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PA AND EXTERNAL TERRACES WITH STRUCTURES AT POOR HILL (SITE P5/227), WAIMATE NORTH

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Abstract. In 1967 site P5/227, Poor Hill (Ngaungau pa), near Waimate North, inland Bay of Islands was mapped after the ridge had been cleared of scrub. Three small excavations were carried out on terraces external to the pa. The lowest terrace produced a rectangle of large postholes suggesting that a big structure once stood there. The other two excavations also indicated the use of terraces for houses and living. Lack of any European artefacts and the traditional evidence suggest a late 18th century date for the site.

In 1967, the presence of an unusual archaeological site P5/227 (N15/43), in the inland Bay of Islands near Waimate North, was brought to the attention of Janet Davidson, then archaeologist at the Auckland Institute and Museum, by Bob Lawn of the New Zealand Forest Service, Kaikohe.The site had been covered in scrub but, after clearing, evidence of Maori occupation was clearly visible. Janet Davidson, Bob and Betty Lawn and I visited the site in September, 1967. A plane-table map was made and a brief test excavation was carried out on one of the terraces where the presence of postholes was established. Arrangements were then made for a further investigation to be done by Ken Gorbey and Trevor Hanson before the area was disced and brought into pasture. This paper describes the site and presents the results of the excavations.

At the time of our field work the area was known locally as "Poor Hill" (Fig. 1) and no Maori name could be found. Subsequent research by Jack Lee (pers. comm.) suggests that the site is very probably Ngaungau pa.

Elsdon Best (1927:228) includes Ngaungau pa in his discussion of a group of pa along the plateau edge north of Ohaeawai and associates them with the Ngati Pou and the Nga Puhi. He also includes plans of some of the pa (1927:182-190) but there is some confusion over the names attributed to each site and their subsequent New Zealand Archaeological Association site numbers (the site numbers shown in Fig. 1 and names given in the caption are an attempt to clarify the relative positions of these sites). It has been suggested that site P5/227 was the most eastern of the group of complex sites protecting the plateau edge from Ohaeawai east and north of the Titahi Stream (F. Barrett, pers. comm.).

Turton in his Maori Deeds (1882:98/VII) states that about 20 acres were purchased by Richard Davis, the missionary, in 1836 and that on "The . . . . land was a pa (fortification) and its name is Ngaungau. Bounded on the west by the the land purchased by Mr Davis of Kotahi: on the south by the Waikaramu stream or the land

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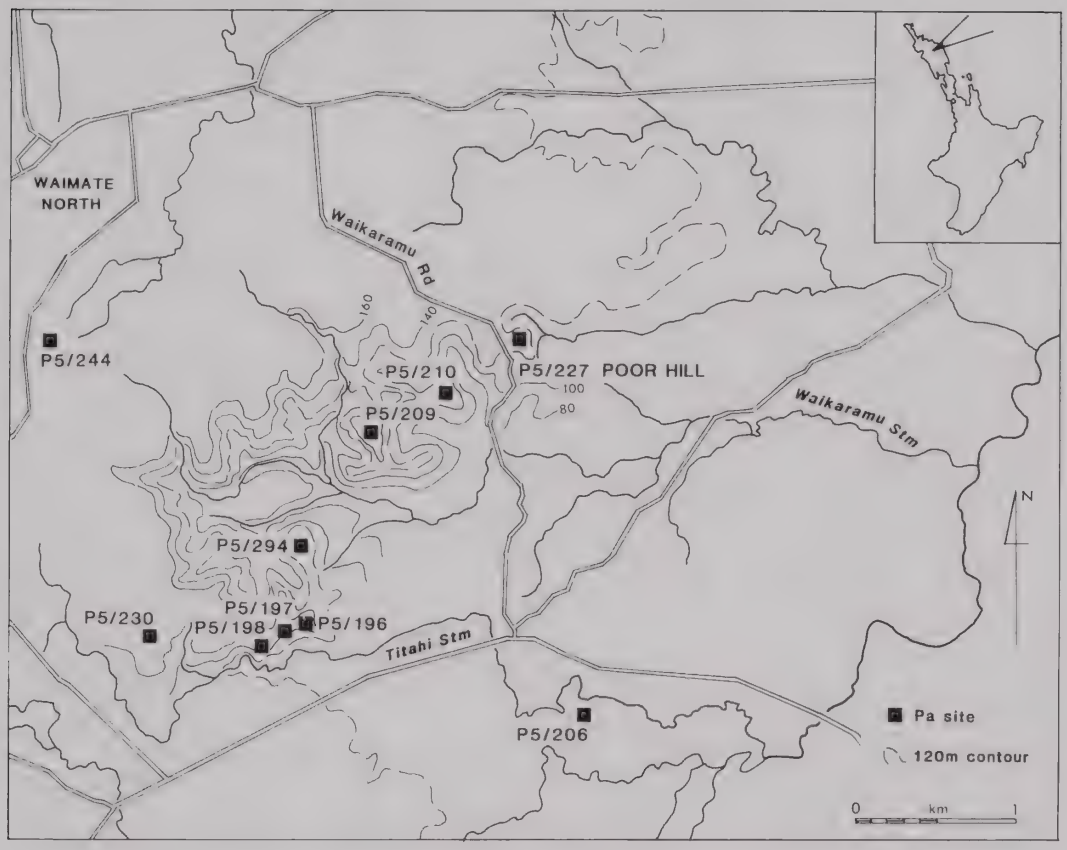

Fig. 1. Location map showing the position of Poor Hill and the positions of nearby pa.

P5/196,197,198 Tapahuarau, P5/206 Ruahoanga, P5/209(i) & (ii) and P5/210 Kaiaia or Te Tou-o-Roro; P5/227 Poor Hill (Ngaungau); P5/230 Nga Puke-pango; P5/244 Pahangahanga; P5/294 Taka-poruruku.

purchased by Mr Williams of Te Morenga: on the east by land purchased by Mr Davis of Kahia and friends." The position of site P5/227 conforms very closely to this description although there are two ridge pa (P5/210 and P5/209) nearby, to the west (Fig. 1) that could also be contenders for the name. The site record forms tentatively give the name Kaiaia or Te Tou o Roro to these sites. Site P5/227 is, in contrast, included within the Old Land Claim 4 of the Reverend R. Davis (J. Lee MS). I have therefore provisionally accepted that the site P5/227 is Ngaungau pa.

Traditionally Ngaungau was a named pa associated with the defeat of the Ngati Pou by the Ngapuhi in the mid to late eighteenth century (Lee 1983:151). Sissons *et al.* (1987:108) say that ". . . the Ngati Hineira lived north of this place [Rua Hoanga pa, P5/206] having captured Ngaungau pa during the conquest of Te Waimate." They point out that dating traditional evidence is difficult but genealogies suggest that the conquest of Waimate may have taken place in the 1770s (1987:146). Although there is no direct evidence, it is possible that the area was resettled by the Ngati Hineira after the defeat of the Ngati Pou.

The Site

The site is situated 1.5 km south east of Waimate North (Fig. 1) on a low rounded ridge end. It consisted of a fortified pa on top of the ridge end (now almost obliterated) and numerous terraces down the slopes where a large settlement was formed external to the pa (Fig. 2). The main ridge runs in an east-west direction but near its end it curves northwards forming a natural shallow north-facing amphitheatre. It is on the northern spur that the fortifications were situated and the majority of terraces have been cut into the amphitheatre slopes below the pa.

The pa on the ridge end was not of very imposing appearance and its natural defences were minimal. Along the southern approach a well preserved ditch was cut across the flat ridge top. It was not unusually wide or deep and the inner bank was low and fairly narrow. Some evidence remained for the former presence of a lateral ditch on the western side. The interior of the pa contained several low, north-south running terraces, one of which contained a rectangular stone hearth. There was also evidence for a well-developed drainage system. The northern end of the pa rose to a low knoll and then dropped into a discontinuous ditch that had a short eastern lateral extension. A narrow inner bank was present along the eastern side but was not evident in the north-western area. No surface evidence for pits was found within the defences or elsewhere on the site but storage could have been above ground or at some distance from the settlement. The local clay soils compare unfavourably with the volcanic soils of the Taiamai Plains a few kilometres to the south. This may have restricted the agricultural potential of the land around the pa.

There were few terraces down the north-western and western flanks of the pa. The most impressive aspect of the site was the tiered effect of the numerous terraces cut into the amphitheatre slopes. The site had been cleared some 20 years before by the previous owner but these terraces had, subsequently, been well-preserved by the scrub cover and, after the recent clearing, their sharp angles still stood out (Fig. 3). There was a complex inter-connecting drainage system associated with the terraces and some of those from the pa drained down the eastern slopes to join those of the terraces in the amphitheatre where the drains were especially noticable and well preserved. There was speculation at the time of the survey as to whether the terraces were for agriculture rather than habitation because of their protected northern aspect and drainage systems but test excavation suggested they were built originally as living terraces. Three terraces were tested, all on the eastern slopes. It was on the biggest of the lower terraces that evidence for a large structure was exposed by Gorbey's excavation.

The terraces on the site appear to be of to two types. The upper ones immediately below the eastern side of the pa were generally long and narrow and some shared a common back scarp. Several were divided into sections by drains or depressions forming "semi-detached" terrace groups. The lower terraces and those around the amphitheatre gully were squarer and generally larger. None of these shared a common scarp. Their floors were more level than the upper terraces and they were in better condition, before ploughing.

On the basis of "on site" observation and a study of the site plan the terraces were divided into two discrete groups, an upper western set and an upper and lower

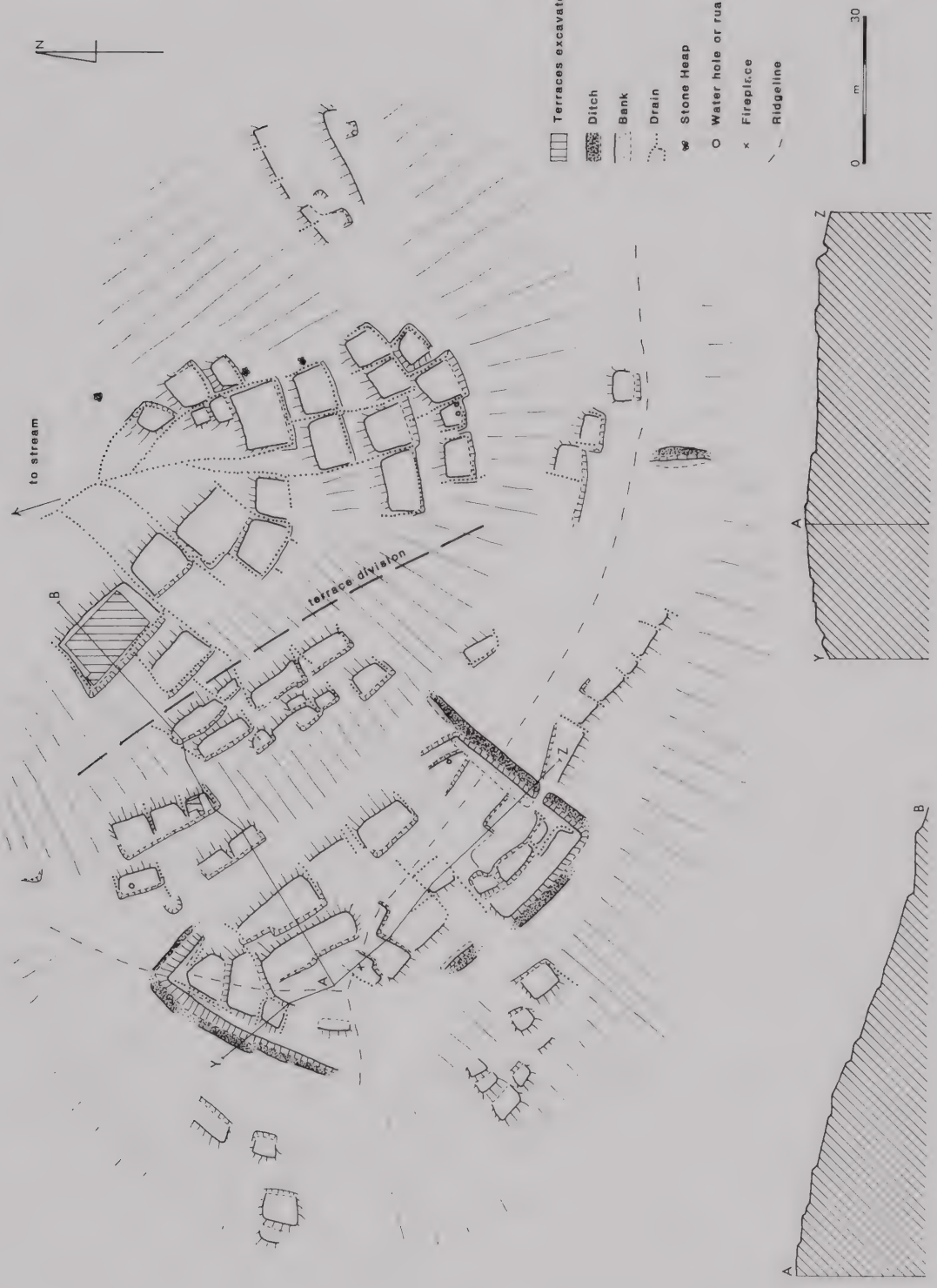

Fig. 2. Plan of site P5/227, Poor Hill.

Fig. 3. Photograph of Poor Hill (P5/227) after clearing, looking south-west.

amphitheatre eastern set (see "terrace divison" on Fig. 2). The area of each terrace was measured and the terraces put in rank order on the basis of their size. The difference between the two terrace groups was subjected to a statistical test based on these ranks (Mann-Whitney "U" test). The probability that the difference between the two groups arose by chance is less than 0.01, which is significant (G. Law pers. comm.). This does not take into account the changes in slope angles (cross-section line A-B runs from about 10° to 16° down the slope) which may have influenced terrace construction. This seems unlikely, however, because terraces on the eastern side of the amphitheatre run from near the top of the ridge to near the bottom regardless of the slope angle and all these terraces follow the amphitheatre pattern. Gorby, in his notes, also commented that the terraces fell into two distinct groups and suggested that they could represent different social units. There could be a number of other reasons for the two contrasting groups such as changes in function or a time difference. There is, however no evidence that the pa and the amphitheatre terraces were not contemporary.

The site is undated. A search, after the area had been disced, revealed no trace of European artefacts which might have been expected on a site say from 1810-1830 onwards and none have been found during subsequent farming operations.

Artefacts

Several complete adzes, a few roughouts and some stone material were collected on the ridge during scrub clearing operations. This collection is held at the Auckland Institute and Museum. A few wooden artefacts have also been recovered from the swamp gully below the pa.

The completed adzes and at least one of the roughouts (38741) appear to be Northland gabbro on the basis of hand held specimen identification (S. Best pers. comm.). The completed adzes (Table 1) are all polished and quadrangular in cross section. There is also one of a similar type, found recently, in the possession of the owners of the site. All the adzes have short straight bevels (once described as a typical Northland type by the late Vic. Fisher of the Auckland Museum). The adzes represent a very interesting, well provenanced, collection.

Another of the roughouts (38745.1), a large, quadrangular, coarse-grained piece of stone with no bevel has three shallow grooves running lengthwise up the "back", separated by four low shoulders. The function of the grooves is iunknown. They do not appear to be natural. The roughout measures 21 cm in length, is 9 cm wide and 3.6 cm thick.

There were several pieces of modified stone as well as chert, an obsidian core and a flat stone with kokowai (red ochre) on it.

Table 1. Adze measurements.

Museum number	length cm	width cm	thickness cm
38744.1	24.1	8.1	3.2
38744.2	21.6	7.6	2.5
38744.3	16.4	6.5	2.5
38744.4	12	7.1	3
—	10	6.5	1.8

The Excavation

Because excavation within the pa defences could have proved too complex for the time available, and in view of the well preserved external terrace system, Gorbey decided to investigate the largest amphitheatre terrace below the pa (Fig. 4). This was the lowest most northerly one and it measured approximately 22 x 11 m. The back of

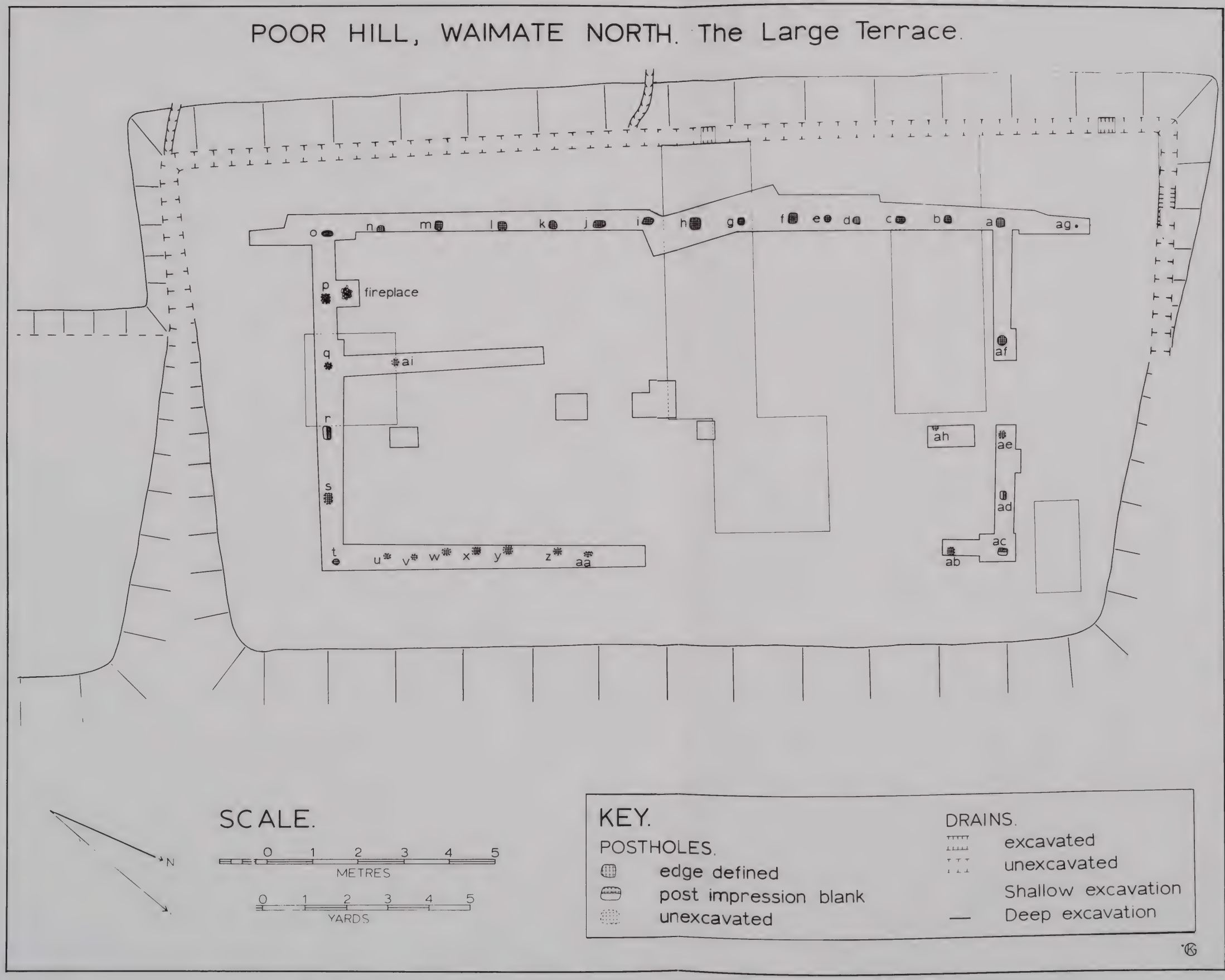

Fig. 4. Original plan of the large amphitheatre terrace, showing the excavated area, by K. Gorbey.

the terrace was cut into the slope to form a lowish scarp and the front (eastern) surface appeared to have been built up with the resultant spoil to extend the platform over the slope. The back drain led into side ones which became "V" shaped depressions directing the water to the amphitheatre gully.

Except for a very thin layer and a scrappy litter layer the surface of the ground proved to be the original floor of the terrace. This produced little except large smudges scattered about the excavation. It was decided to follow one of these down into the soil profile. At an approximate depth of 30-40 cm the smudges turned into beautifully defined postholes where they entered the hard clay pan. By vigorous trenching the posthole line was followed, by-passing the confusing smudges on the way. It produced the layout of posts as shown on the terrace plan (Fig. 4). Gorbey suggests that, due to the acid(?) soil environment, the postholes were not clearly evident until from 30-50 cm down. Their upper profiles had been removed by chemical and soil action.

The posts appeared generally large and rectangular. A few postholes were fully excavated and, of these, a number were clearly slabs and buried quite deep (no details of measurement or depth are available). The posthole distribution suggested a large structure some 15 x 7 m in size.

A cluster of rocks and charcoal was found inside the structure against the south-west wall near posthole "P". Gorbey interpreted this heap as a fireplace but said it was not a four sided hearth. No entrance way was established although the presence of a small posthole "ag" north of but in line with the west wall could possibly suggest the presence of a light porch.

Parts of the interior of the structure were tested but only the possible postholes "ai" and "ah" gave any indication of some sort of roof support. There was no evidence for a large centre back post to support a ridge pole. Testing confirmed the surface evidence of the drain running along the back and sides of the terrace. Only a few flakes of obsidian and chert were found. These are not now available.

A smaller, now unidentified, terrace was tested by Trevor Hanson at the same time. Two sides of what appeared to be a small rectangular structure were located (Gorby pers comm.). There seemed to have been a replacement of posts so that the structure could have stood for some time. A core (stone unspecified) with several fitting flakes came from this terrace.

At the time of the original survey one of the upper semi-detached terraces (Fig. 5) on the eastern slopes below the pa (not an amphitheatre terrace) was also tested by Davidson. Only the north-eastern third was excavated. A very shallow deposit of top soil and litter was removed to reveal an occupation surface and a line of insubstantial postholes along the front of the terrace. There were also indications for scattered stakeholes and a diffuse semicircular burnt patch containing charcoal showed on the surface. This was centrally placed on the terrace but only half was exposed by the excavation. It was about 80 cm in size.

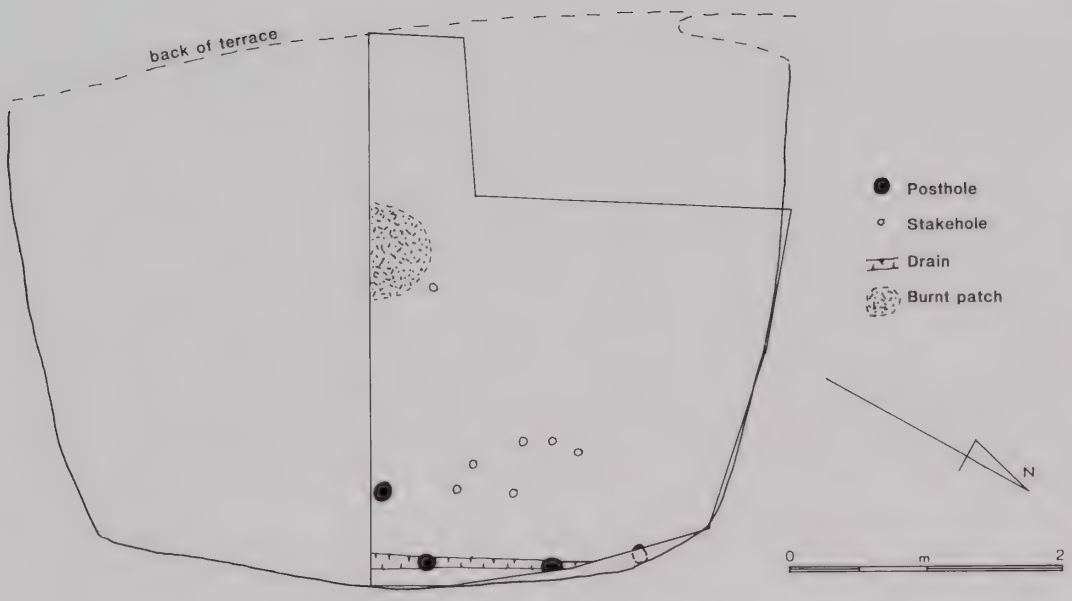

Fig. 5. Plan of Davidson's excavation on an upper "semi detached" terrace.

At the time little was known archaeologically about the construction of prehistoric Maori dwellings and this terrace evidence was regarded as too flimsy to have represented a living structure but, with hindsight, it seems probable that the two insubstantial terrace structures were both houses.

All three terraces indicated a one phase occupation.

Conclusions

The Poor Hill site, consisting of a ridge pa and associated external terracing lies within the historical Old Land Claim 4 of the Reverend Richard Davis. The site is most likely the traditional Ngaungau pa.

The pa was ploughed over, the ditches and banks destroyed and fences, holding yards and a water tank placed on the site soon after it was surveyed and excavated in 1967. The amphitheatre terraces were also modified but most are still clearly visible on the landscape.

At the time of the survey the site was considered unusual because of the number of well preserved large terraces cut into the slopes below the pa itself.

The amphitheatre terraces, which are statistically different in size from the terraces immediately below the pa, appear to be later additions because of their state of preservation. It is not clear whether the pa was still in use at the time.

The excavation by Gorbey on the lowest and largest amphitheatre terrace provided posthole evidence for a large building. However, insufficient knowledge of

the whole plan of the structure, and especially its interior arrangements, makes further interpretation in detail difficult. Because of its size it could represent an important structure, but its low position does not conform to the historical interpretation for siting the main *wharepuni* of an open settlement and there is little flat ground around it which could be interpreted as an open space or *marae*.

The testing of two other terraces indicated that they were for living and had small flimsy houses on them. There was only one phase of occupation on each terrace.

The lack of any European artefacts, in spite of considerable soil disturbance from farm discing and the excavations, together with the traditional evidence, suggest that the site was pre-European and probably of late 18th century origin.

There appears to be no obvious focus to the set of amphitheatre terraces unless the main or ceremonial position was on the top of the ridge or within the pa. Still, if one takes the large house on the largest and lowest amphitheatre terrace as the most important late building on the site and accepts that these terraces are later than the ridge pa, it could be postulated that access to the undefended settlement was up the gully making the house the focal point for groups approaching that part of the site. The structure could then be seen as a reception or visitors' house but this would indicate the concept of a village type very different from the traditional view of a Maori settlement.

There also remains the possibility that the structure may not have been a house at all but an unroofed, strongly built, rectangular enclosure serving some unknown function.

Acknowledgements. I would like to thank the following. The owners of the site, Mr W. and Mrs D. Paterson, for access to and information about the site and its recent history; the Toia family, Waimate North, for their interest and help while visiting the area; Bob and Betty Lawn for lending me their records and photographs taken at the time of the excavations; Janet Davidson for comments on her excavation at the site and for reading and discussing the manuscript with me; Aiden Challis and Fenwick Barrett for helpful information about the site and some of the local history. Figures 1,2,3,5 were prepared for publication by Caroline Phillips.

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SOURCE DETERMINATION OF OBSIDIAN FROM THE WESTFIELD (R11/898) SITE USING GEOCHEMICAL ANALYSIS

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Abstract. Non-artefact obsidian from the Westfield (R11/898) site was sourced using X-ray fluorescence (XRF) chemical analysis on seven flakes of unknown origin and selected geological samples of known source. Both qualitative and quantitative methods of clustering the unknowns indicates that the obsidian from this site comes from as few as two sources. Mayor Island is the most likely source of the green obsidian, and it is likely that most of the grey unknowns came from a Great Barrier Island source. Within the constraints of possible error, the idea of only two sources fits accepted theories on the origin of this raw material for temporary sites on the Auckland isthmus.

The results of the excavation of the Westfield (R11/898) site are outlined by Furey (1986). She concludes that this was a temporary camp within an area of gardening. An age range of 309 ± 59 to 421 ±59 years B.P. is indicated by radiocarbon dating. Cultural remains occur in three main stratigraphic layers, and two occupation periods are recognised. A range of artefacts were collected, including a total of 626 obsidian pieces (forming some 52% of the lithic material, Furey 1986). This obsidian was classified according to colour, as shown in her Table 1, with the note that ". . . the green flakes are probably from Mayor Island and the grey obsidian is likely to be from several sources." (Furey 1986:18). This paper outlines an attempt to provide a more quantitative basis for the sourcing of this obsidian.

Sample selection

Two hundred and fifty two non-artefact pieces of obsidian from site R11/898 held at the Auckland Museum were used in this study. These pieces were assigned to one of the three designated stratigraphic layers, with 85 pieces having no layer assigned to them. A preliminary sort was then carried out on the basis of the series of hand specimen parameters shown on the flowchart of Moore (n.d.). In practice the colour (especially transmitted) was the major determining factor in this sorting process, mainly due to the small size of the obsidian pieces.

Two major considerations influenced the choice of samples to be analysed by the x-ray fluorescence (XRF) method:

(1) sample size, ideally 10 grams of material is required, this was rarely achieved in the given sample set.

(2) the method is destructive, thus the sample was on non-artefact material only.

The results of this preliminary sort, and the samples chosen for XRF analysis are shown in Table 1.

As a control on both elemental characterisation of the likely sources and the analytical method, obsidian from known localities, for which abundant sample was available, was also analysed. This was in response to the fact that only two of the samples to be sourced were of >10 g weight. By running multiple analyses of the known samples (including runs <10 g) the effect of lowered sample size (if any) could be assessed. The control rocks were taken from the reference collection of the Department of Anthropology, University of Auckland, and from two source areas:

(i) Great Barrier Island (grey obsidian) — #680/4 (Te Ahumata), #679/26 (Awana), #2935; and,
(ii) Mayor Island (green obsidian) — #504, #1514/2.

Mayor Island is a well documented source for green obsidian in New Zealand (Ward 1972). The Great Barrier Island source was suggested by Louise Furey (pers. comm.), and has been cited in the literature as a major obsidian source for the Auckland area (Fox 1982; Ward 1974).

Table 1. Preliminary sort and sample selection of obsidian flakes from the Westfield (R11/898) site.

	Sample size	Sample analysed	Percentage	
LAYER 1	64 pieces			
green	15 pieces	not suitable	(24.%)	OCCUPATION II
grey	49 pieces	#246 (12.7 g)	(76.6%)	
LAYER 2	20 pieces			
green	6 pieces	#54 (7.14 g)	(30%)	
grey	14 pieces	#66 (5.05 g)	(70%)	OCCUPATION I
LAYER 3	83 pieces			
green	23 pieces	#105 (5.14 g)	(27.7%)	
grey	60 pieces	#46 (11.28 g)	(72.3%	
NO LAYER	84 pieces			
green	25 pieces	#444 (3.89 g)		
grey	59 pieces	#379 (6.66 g)		

Total sample size = 252, green = 69 (27.4%), grey = 183 (72.6%).

Analytical procedure

The procedure used was that used for the geochemical analysis of rocks by the Department of Geology, University of Auckland. All the materials analysed were

selected for freshness, thus avoiding possible chemical changes (ie. clay formation) inherent in weathering processes. The analyses were carried out by the method of Norrish & Hutton (1969), using a Phillips PW 1410 x-ray spectrometer. Major elements (those generally occurring in abundances of >0.1 weight percent (wt %)) were analysed using glass discs consisting of sample powder and lanthanum flux. Those elements of lower abundance (reported as parts per million, or ppm) were analysed on boric acid backed discs of pressed powder. Analysis was run under the detection limits and instrumental settings as outlined by Parker (1983).

Results

The analytical results are presented in Table 2. The elemental weight percent values are also shown in Table 2, and can be used for direct comparison with the values presented by Duerden *et al* (1987, Table 1; see extract in Table 3) which were obtained by the PIXE/PIGME method. The relative percent errors between the control samples of differing aliquot weights were found to be within those listed in Parker (1983).

Comparison of the elemental weight percent values of the control analyses of this study with the corresponding values of Duerdxen *et al* (1987) shows a general lack of similarity, except for Ca, Sr, Zr, Y and Mn, and, Ti andSi (for Mayor Island only), with Rb from Great Barrier also similar to these workers. Unless gross rock chemical inhomogeneity (strangely affecting some elements and not others) can be used to explain this discrepancy, it would appear that the differences are due to differences in methodology. PIXE/PIGME is more sensitive to sample surface effects than XRF.

Sample 679/26 from Awana stands out, especially with respect to LOI and H_20^- which total 7.02 weight percent. This may be explained by weathering processes, as volcanic glass (obsidian) is particularly vulnerable to hydration reactions. Thus this is the only sample which cannot be considered fresh — generally denoted by low LOI and H_20^- values — and is thus not considered in the following attempts at sourcing.

Sources

The following sources are suggested by comparing the chemical data (known and unknown sources) presented in Table 2, and backed up by the corresponding values of Duerden *et al* (1987):

(a) green obsidian pieces (#'s 54, 105, and 444) are sourced to the Mayor I 'green' source (control samples 1514/2 and 504);
(b) grey pieces (#'s 49, 14, 60, and 59) are sourced to Great Barrier I (samples 680/4 and 2935).

As an additional quantitative comparison of this data, clustering analysis, utilising Euclidean distances, was employed. This technique supported the above conclusions with respect to source. The means and standard deviations of the two clusters are listed in Table 4, and provide a numeric summation of the raw data. Possible shortcomings include the small sample size, and it should be noted that the

Table 2. Analytical results of obsidian from the Westfield site.

Sample	680/4	679/26	2935	246
Major elements — wt. % (elemental wt. %)				
SiO_2	75.79 (35.4)	70.95 (33.2)	75.96 (35.5)	75.69 (35.4)
TiO_2	0.11 (659)	0.10 (599)	0.11 (659)	0.10 (599)
Al_2O_3	12.80 (3.39)	12.72 (3.37)	12.57 (3.33)	12.59 (3.33)
Fe_2O_3*	1.47	1.67	1.42	1.37
MnO	0.03 (232)	0.04 (310)	0.03 (232)	0.03 (232)
MgO	0.17	0.12	0.15	0.20
CaO	0.75 (0.54)	0.75 (0.54)	0.69 (0.49)	0.68 (0.49)
Na_2O	3.83 (1.42)	2.31 (0.85)	3.94 (1.46)	3.80 (1.41)
K_2O	4.69 (1.95)	4.63 (1.92)	4.80 (1.99)	4.83 (2.01)
P_2O_5	0.03	0.02	0.03	0.02
H_2O^-	0.03	1.02	0.18	0.15
LOI	0.13	6.00	0.16	0.41
Total	99.83	100.33	100.03	99.87
Trace elements (ppm)				
Ba	513.3	737.9	441.3	445.7
Rb	195.7	177.3	196.6	193.3
Sr	29.5	28.6	21.4	22.7
Pb	26.1	24.4	23.8	23.1
Th	21.4	15.7	25.0	18.3
Zr	142.0	194.3	132.3	133.6
Y	33.1	46.1	36.8	37.3
La	39.0	34.3	32.1	36.1
V	bdl	bdl	bdl	2.2
Cr	bdl	bdl	bdl	bdl
Ni	bdl	bdl	bdl	5.7
Cu	8.3	bdl	7.1	10.2
Zn	35.5	61.6	38.4	38.4

Sample	66	46	379	1514/2
Major elements — wt. % (elemental wt. %)				
SiO_2	75.82 (35.4)	76.41 (35.7)	75.92 (35.5)	73.54 (34.4)
TiO_2	0.11 (659)	0.12 (719)	0.10 (599)	0.23 (1379)
Al_2O_3	12.62 (3.34)	12.70 (3.36)	12.88 (3.41)	10.48 (2.77)
Fe_2O_3*	1.43	1.42	1.45	4.74
MnO	0.02 (154)	0.03 (232)	0.03 (232)	0.10 (775)
MgO	0.16	0.18	0.23	0.06
CaO	0.69 (0.49)	0.68 (0.49)	0.76 (0.54)	0.21 (0.15)
Na_2O	4.01 (1.49)	3.88 (1.44)	3.90 (1.45)	5.84 (2.17)
K_2O	4.85 (2.01)	4.80 (1.99)	4.70 (1.95)	4.37 (1.81)
P_2O_5	0.03	0.02	0.03	0.02
H_2O^-	0.11	0.02	0.04	0.02
LOI	0.18	0.15	0.29	0.00
Total	100.01	100.40	100.33	99.68

Table 2. Continued.

Sample	66	46	379	1514/2
Trace elements (ppm)				
Ba	383.8	436.9	480.3	bdl
Rb	194.5	194.7	195.4	132.4
Sr	21.8	22.2	30.8	bdl
Pb	25.6	22.7	23.8	26.3
Th	23.2	19.3	17.5	14.2
Zr	133.5	133.8	136.7	1015.7
Y	36.2	35.7	34.2	125.5
La	36.0	36.9	36.6	86.2
V	bdl	2.7	bdl	bdl
Cr	5.7	bdl	7.4	bdl
Ni	bdl	bdl	8.2	8.3
Cu	5.6	9.8	12.8	bdl
Zn	38.3	38.0	37.3	221.1

Sample	504	54	105	444
Major elements — wt. % (elemental wt. %)				
SiO_2	74.36 (34.8)	72.27 (33.8)	73.74 (34.5)	75.53 (34.4)
TiO_2	0.22 (1319)	0.22 (1319)	0.22 (1319)	0.20 (1199)
Al_2O_3	10.60 (2.81)	9.75 (2.58)	10.51 (2.78)	9.69 (2.56)
Fe_2O_3*	4.56	5.93	4.47	5.46
MnO	0.09 (697)	0.13 (1007)	0.09 (697)	0.11 (852)
MgO	0.09	0.12	0.12	0.09
CaO	0.21 (0.15)	0.21 (0.15)	0.20 (0.14)	0.20 (0.14)
Na_2O	5.73 (2.13)	6.22 (2.31)	5.75 (2.13)	5.89 (2.19)
K_2O	4.44 (1.84)	4.28 (1.78)	4.40 (1.83)	4.39 (1.82)
P_2O_5	0.02	0.03	0.02	0.02
H_2O^-	0.02	0.12	0.02	0.05
LOI	0.05	0.21	0.20	0.03
Total	100.40	99.48	99.75	99.67
Trace elements (ppm)				
Ba	bdl	bdl	49.8	bdl
Rb	133.2	130.5	131.2	142.4
Sr	2.1	bdl	bdl	bdl
Pb	26.2	26.7	25.6	27.3
Th	17.8	15.1	13.3	13.7
Zr	1001.8	1081.0	989.4	1171.2
Y	124.6	139.4	122.8	143.2
La	91.7	91.9	89.0	99.2
V	bdl	0.9	bdl	bdl
Cr	bdl	bdl	bdl	bdl
Ni	8.2	6.1	9.3	bdl
Cu	8.4	6.4	10.2	bdl
Zn	215.4	256.9	213.2	253.0

bdl = below detection limit. Fe_2O_3* = total iron reported as Fe_2O_3

Table 3. Values listed by Duerden *et al* (1987) for the source areas of this study.

Locality	Awana	Te Ahumata	Mayor I Green
SiO_2	40	41	35
TiO_2	480 — 730	420 — 620	1000 — 1500
Al_2O_3	6.03 — 7.73	6.01 — 6.87	4.25 — 5.01
MnO	220 — 330	210 — 300	730 — 1060
CaO	0.45 — 1.16	0.37 — 0.62	0.06 — 0.17
Na_2O	1.56 — 3.12	2.48 — 2.74	3.61 — 4.09
K_2O	3.2 — 4.6	3.9 — 4.3	3.1 — 3.8
Trace elements (ppm)			
Rb	151 — 221	192 — 226	141 — 190
Sr	10 — 70	10 — 30	0 — 40
Zr	110 — 170	90 — 140	990 — 1200
Y	10 — 50	20 — 40	80 — 160

values in Table 4 for Ba, Sr, V, Cr, Ni and Cu are rather meaningless since they did not occur in concentrations above the detection limits for all samples. A further weakness of the Euclidean distance method is sensitivity to observation order. However, the clustering results were identical regardless of how the data was ordered.

Discussion

Although the original qualitative sort is open to error and the quantitative sourcing is of small sample size, a single source (Mayor I) for the green obsidian seems valid. The grey grouping, however, is not as easy to substantiate because, while some grey source groups can be eliminated as unlikely, a number of possible sources still exist in other clusters, as shown by Moore's (n.d.) chart. This lack of positive sourcing is accentuated by the small percentage (2.2%) of grey obsidian analysed in this study. Logically a Great Barrier I source would fit, being the closest source of obsidian to this site, but, as Seelenfreund-Hirsh (1985) asserts, distance to source may not have always been the primary determining factor. However, as Seelenfreund-Hirsh (1985) concludes, temporary sites (as site R11/898 most probably was) tend to have a smaller number of sources represented. The inference of only two sources may, therefore, best fit within the overall New Zealand situation.

The change in the relative importance of the two (?) sources with time provides a further point for discussion. Over time the total percentage of green obsidian changes — from 30.8% in Occupation I to 21.3% in Occupation II (Furey 1986, Table 1). No figures were calculated for this study due to the large percentage (33.8) of obsidian in the no layer category. Furey's findings are in line with the work of Leach & de Souza (1979), who note the relative reduction, with time, of obsidian from the Mayor I

Table 4. Cluster statistics — mean values and standard deviations (in brackets).

Cluster	1 = Great Barrier I		2 = Mayor I	
Major elements (wt. %)				
SiO_2	75.93	(0.2533)	73.89	(1.1916)
TiO_2	0.11	(0.0075)	0.22	(0.0110)
Al_2O_3	12.69	(0.1245)	10.21	(0.4464)
Fe_2O_3*	1.43	(0.0339)	5.03	(0.6351)
MnO	0.03	(0.0041)	0.10	(0.0167)
MgO	0.18	(0.0293)	0.10	(0.0251)
CaO	0.71	(0.0366)	0.21	(0.0055)
Na_2O	3.89	(0.0758)	5.89	(0.1978)
K_2O	4.78	(0.0674)	4.38	(0.0594)
P_2O_5	0.03	(0.0052)	0.02	(0.0045)
Trace elements (ppm)				
Ba*	450.22	(43.7560)	9.96	(22.2712)
Rb	195.03	(1.1343)	133.94	(4.8433)
Sr*	24.73	(4.2378)	0.42	(0.9391)
Pb	24.18	(1.3674)	26.42	(0.6301)
Th	20.78	(2.9376)	14.82	(1.7964)
Zr	135.32	(3.5841)	1051.82	(75.5082)
Y	35.55	(1.6059)	131.10	(9.4578)
La	36.12	(2.2498)	91.60	(4.8420)
V*	0.82	(1.2750)	0.18	(0.4025)
Cr*	2.18	(3.4249)	0.00	(0.0000)
Ni*	2.32	(3.6750)	6.38	(3.7519)
Cu*	8.97	(2.5367)	5.00	(4.7582)
Zn	37.65	(1.1327)	231.92	(21.2649)

* = may be invalid due to being bdl

source. They cite the discovery of new obsidian sources as contributing to this change, with the additional factor, noted by Seelenfreund-Hirsh (1985), being restriction of access due to the increase of warfare and territoriality in later prehistory.

Acknowledgements. I thank L. Furey and Dr N. Prickett for making the Westfield obsidian pieces available, and providing stimulating discussion relevant to obsidian sources. Prof. R. Green made obsidian from the collection of the Anthropology Department, Auckland Univeresity available to me, and critically read the draft of this paper.

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A BROADWOOD SQUARE PIANOFORTE IN THE AUCKLAND INSTITUTE AND MUSEUM

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Abstract. The constructional details and action mechanism of a nineteenth-century square pianoforte from the Museum collection are described, and the date of manufacture estimated. Brief reference is made to the New Zealand historic background.

The dismantling for restoration of a pianoforte from the Auckland Institute and Museum collection has provided an opportunity to inspect and report on the internal action mechanism. The instrument, by John Broadwood and Sons, is of the square variety, similar to that previously documented by the writer (Annabell 1983). As in that survey, constructional details are summarised here (see Table 1), with special attention in this instance to the action mechanism as representative of a specific type and stage in the development of pianoforte construction. Also, the present circumstances of restoration have made possible the documentation of some details and measurements with greater accuracy. Discrepancies in case size from one end of the instrument to the other, for instance, are noted, and micrometer measurements of string diameters are listed in Table 2.

THE ACTION (Figs.1,2)

The internal action mechanism of the instrument is in two sections which may each be lifted out in its entirety, the larger section comprising 56 notes, F^1 to c^3, and the smaller section comprising 17 treble notes, $c^{\#3}$ to f^4. Each section incorporates the relevant keys with their shafts, escapements, underhammers, and hammers. This method of construction facilitates inspection of the mechanism which is essentially that of the English Square Pianoforte Action patented by Broadwood in 1815, as illustrated by Closson (1974:133). Broadwood's earlier simple square pianoforte action incorporating a double-headed jack activating underdampers and hammers was without repetition action (ibid.131). The present instrument has a repetition device in which escapement is effected by a "hopper" (short for "grasshopper"), first patented by John Geib in 1786 (Harding 1978:56), which has a built-in regulating screw (Fig.1). An underhammer lies in reverse direction beneath the hammer proper, pushing up the hammer shaft when the mechanism is activated (Fig.1). The two removable sections fit back into the pianoforte case in front of the vertical rods of the overdampers, which are activated with the mechanism when the key is depressed.

Table 1. Details of square pianoforte by John Broadwood and Sons.

Part	Details
Case	Mahogany, unornamented, rosewood nameboard. Fretwork panels either side of nameboard label, green cloth behind. Depth of case without lid, bass end, 27.8 cm, treble end, 28.2 cm. Length at spine, 171.4 cm, at front, 171.5 cm, total length at bottom of case moulding, 173.8 cm. Breadth, back edge to front edge, 68.2 cm. Case thickness, back frame, 3.5 cm, floor, 8.6 cm. Lid, main section, length, 174.8 cm, breadth, bass end, 50.7 cm, treble end, 50.9 cm, depth, 1.2 cm, joined with 6 brass hinges to front section, breadth, 19.6 cm. Keyboard flap, length, 103.6 cm, breadth, 21.7 cm.
Legs	4, curved-surfaced, tapering, circular banding top and bottom. Height from bottom of castor, 54 cm, from top of castor, 45.8 cm. 1 pedal leg of similar design.
Keyboard	6-octave compass, F_1 to f^4. Key surfaces and edges in good condition. Wood moulding on key fronts. Key-to-key length, flush with sides of nameboard, 101 cm.
Nameboard label	John Broadwood & Sons, Manufacturers to (Her) Majesty, Great Pulteney Street, Golden Square, London. White oblong inset, possibly varnished parchment. Black Gothic-type lettering.
Hitchpin plate	Iron, black, perforated over surface with 15 large holes of even size. Joins treble end of wrestplank at rear. Coarse woodwork decoration in rear triangular space between plate and case sides.
Braces, struts, suspension bars	1 only flat-sided iron brace, black, extending from outer curve of hitchpin plate to wrestplank between treble notes c^3 and $c^{\#3}$. Length 37.5 cm, depth, 3.5 cm, width 1.2 cm.
Wrestplank	Light-coloured oak wood, maple veneer.
Soundboard	Light-coloured spruce wood, grain running diagonally from rear of keyboard towards hitchpin plate. Thickness, 6 mm. Extends from hitchpin plate over surface interior to treble note $c^{\#3}$.
Bridge	Light-coloured wood with brown fleck. Stepped at note 56 before top 17 treble notes.
Stringing	Iron, decreasing in thickness from bass to treble, 11 single in bass close wound with copper wire, remainder bichord, plain wire.*
Dampers	54 upright overdampers up to $a^{\#2}$, red felt or material centre core and base, white felt surround. 19 treble strings undamped.
Hammers	Small heads, some variation in size, more apparent in top treble. Centre wood core covered 1 layer leather, 1 layer of skin or leather, outer layer of felt.

Part	Details
Manufacturer's marks & nos.	53543 ink handwritten lefthand corner of wrestplank, initials "T.G." handwritten below. Wood key shaft of note 56, name "D. Scott" incised on top, 53543 handwritten in pencil on side. Key nos. 1-73 incised from bass to treble on top surfaces of wood key shafts. Key no.1 has handwritten pencil dates on side of shaft, 6/5/43, 14/6/41, also handwritten capital D on top surface. (Note is F). Manufacturer's name on hardware: Leg castors, "Cope's Patent", lid hinges, "Cope's".

* Micrometer measurements of overall and core diameters of the strings are given in Table 2.

Table 2. Micrometer measurements of string diameters, square pianoforte by Broadwood.

	String No(s.)	Overall mm	Core mm
Single (overspun)	1	2.5	1.1
	2	2.35	1.1
	3	2.225	1.1
	4	2.125	1.1
	5	2.15	1.1
	6	2.015	1.1
	7	2.05	1.1
	8	1.6	.925
	9	1.55	.925
	10	1.4	.925
	11	1.37	.925
Bichord	12	1.05	
	13	1.05	
	14	.975	
	15	.975	
	16	.975	
	17	.975	
	18	.925	
	19	.925	
	20	.925	
	21	.9	
	22	.9	
	23	.9	
	24	.9	
	25 - 29	.85	
	30	.825	
	31	.825	
	32	.825	
	33	.8	
	34	.8	
	35	.8	
	36	.8	
	37 - 43	.775	
	44 - 51	.7	
	52 - 59	.7	
	60.- 73	.675	

DATE OF THE INSTRUMENT

The number 53543 handwritten in the lefthand area of the wrestplank, and also on the side of key shaft 56, is assumed to be the serial number. Taylor (1981:38) lists under Broadwood squares the following serial numbers and their starting dates: 52087 — 1840; 58000 — 1845. From this premise the instrument may be broadly dated between 1840 and 1845. Cross reference with another source which gives 55701 as the starting number for Broadwood squares in 1843 (Pierce 1965:40) reduces this dating from a 5- to 3-year span (1840-1843). The earliest of two handwritten pencil dates (which may be tuning dates) on key shaft 1, however, is 14/6/41, thus narrowing the date of manufacture to between 1840 to 1841.

Due to obscuration of the lettering, it is unclear whether that part of the fallboard label acknowledging royal patronage reads "Manufacturers to 'His' or to 'Her' Majesty." If the latter, the date of manufacture would be after Queen Victoria's accession in 1837, and this accords with the above dating. The solid metal hitchpin plate was an invention of Broadwood's as early as 1821 (Harding 1978:200). Its combination in the present instrument with a solid metal brace and the confident placing of that brace as a link between plate and wrestplank suggests an established usage which may well have extended into the 1840s.

THE NEW ZEALAND HISTORIC BACKGROUND

(Abbreviations used below are: OCMar = Old Colonists' Museum Accession Register; OCMc = OldColonists' Museum correspondence; AIMar = Auckland Institute and Museum Accession Register; APL = Auckland Public Library.

The pianoforte was accessioned by the Old Colonists' Museum, Auckland, on June 16, 1937 (OCMar 1934-1964:1420, APL). Details noted at that time were: "Brought to New Zealand by Miss Christopher, who married Samuel Clarke, son of George Clarke, Protector of Aborigines. Philip Armstrong, donor of the piano, is the great-great-grandson of George Clarke". The marriage of Samuel Clarke to Mary Christopher is recorded in *The New-Zealander* 4 July 1857,(p.3,col.1).

On the day of its arrival at the Old Colonists' Museum (29/4/37), the Director, John Barr, wrote to Philip Armstrong requesting more information on the instrument, which he stated had been in New Zealand "for over 100 years" (OCMc,APL). This, however, would make the instrument pre-1837, beyond the concluded date of manufacture as set out above. No record of a reply, apart from the details noted above, has been located. The pianoforte was presented to the Auckland Museum by the Auckland City Council with other specimens from the Old Colonists' Museum in 1965 (AIMar 1958-1965, 78/65).

Acknowledgements: Thanks are due to the Museum's Voluntary Curator of Musical Instruments, Len Stanners, for making known to the writer details of the pianoforte's proposed restoration and availability for inspection. The assistance of the restorer Paul Downie, particularly in supplying the scientific measurements of the stringing, is greatly appreciated.

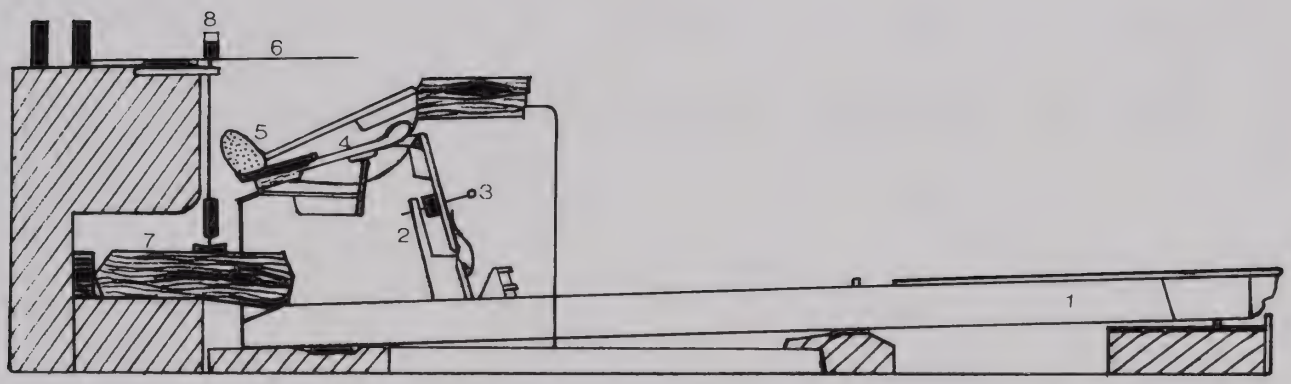

Fig. 1. Sketch of English square pianoforte action, Broadwood, 1815. (After Closson 1974:133).
1. Key. 2. Escapement ("hopper"). 3. Regulating screw. 4. Underhammer. 5. Hammer. 6. String. 7. Damper crank. 8. Damper.

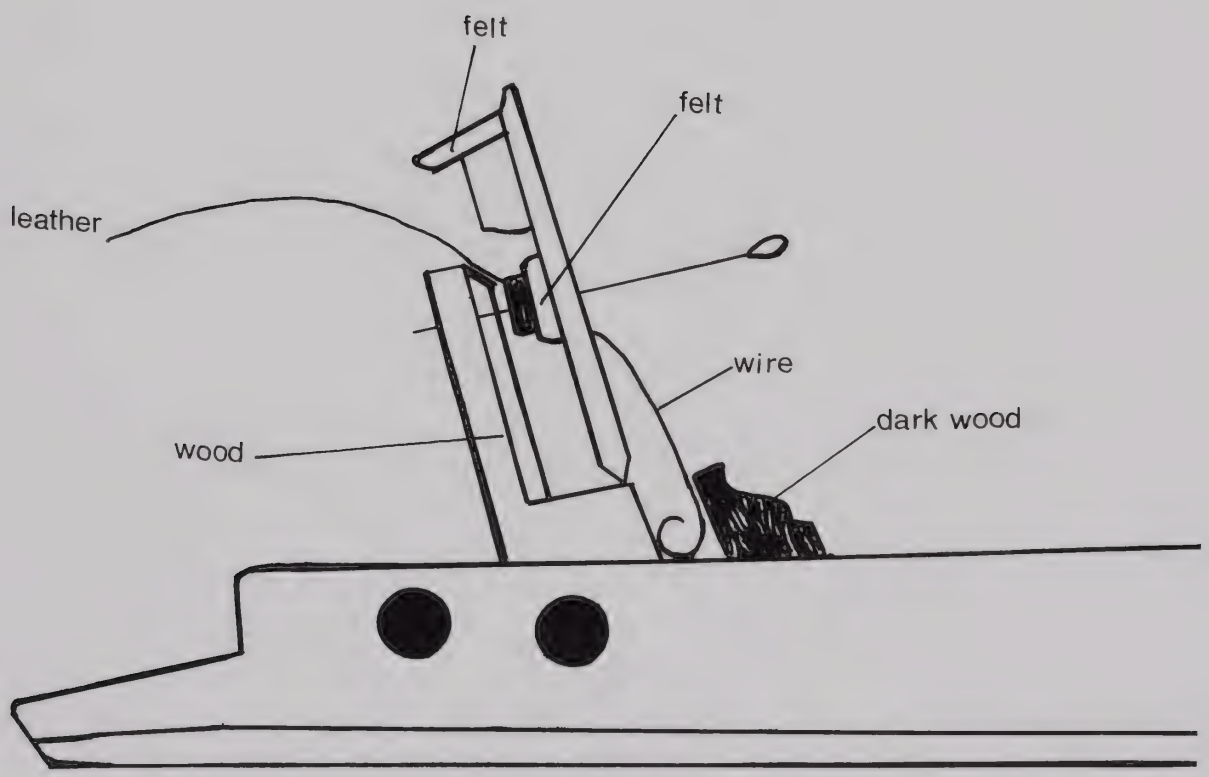

Fig. 2. Sketch (actual size) of key shaft 37 (f^1) with hopper device, square pianoforte by Broadwood, Auckland Institute and Museum.

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TAXONOMIC NOTES ON THE MITROMORPHA GROUP OF THE FAMILY TURRIDAE (MOLLUSCA : GASTROPODA : BORSONIINAE)

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Abstract. The genus *Mitromorpha* Carpenter is divided in the subgenera *Lovellona* Iredale, *Mitrolumna* Bucquoy, Dautzenberg & Bouge, and *Anarithma* Iredale. Some Indo-Pacific species of the *Anarithma* group are elucidated on the basis of their type specimens.

Early authors usually assigned species of the *Mitromorpha — Mitrolumna* group to either the Columbellidae or Mitridae, and the majority of *Anarithma* species were described in the genus *Columbella* on the basis of the "V"-shaped groove on the columella which closely resembles the "split tooth" of some species of Columbellidae. Thiele (1924) was the first author who examined the radula of *Mitra lachryma* Reeve, 1845 [= *Mitromorpha (Anarithma) metula* (Hinds, 1843)]. He excluded the species from the Mitridae and the Columbellidae and relocated it in the subfamily Mangeliinae, family Turridae. He also remarked on the close similarity of the radula of *Mitromorpha filosa* (Carpenter, 1864) to the radula of *Anarithma.* Thiele's paper appears to have been overlooked by subsequent authors and Powell (1966) continued the placement of *Anarithma* in the Columbellidae. Orr (1959), who examined the radula of *Lovellona atramentosa* (Reeve, 1849), found it to be closely similar to *Mitromorpha filosa* (Carpenter), and re-located *Lovellona* Iredale, in the Turridae.

Two recently published papers (Kilburn 1986 and Drivas & Jay 1986) deal with some species of the Mitromorpha group from South Africa and Reunion Island.

Family TURRIDAE

Subfamily **Borsoniinae** Bellardi, 1875

(Synonyms: Diptychomitrinae Bellardi, 1889 *(nomen oblitum);* Mitromorphinae Casey, 1904 [May]; Mitrolumninae Sacco, 1904 [August]).

The assignment of the *Mitromorpha — Mitrolumna* group of species tothe Borsoniinae by Powell 91966) and Kilburn (1986) appears to be an appropriate placement and a suppression of the forgotten family group Diptychomitrinae Bellardi, would thus become unnecessary.

Genus **Mitromorpha** Carpenter, 1865

Mitromorpha Carpenter, 1865, Ann.Mag.Nat.Hist. (3) 15:182. Type species of M *M.filosa* Carpenter = *Daphnella filosa* Carpenter, 1864 (non *Columbella filosa* Dujardin, 1837 = *Mitromorpha*) = *Mitromorpha carpenteri* Glibèrt, 1954. Recent, Eastern Pacific.

Shell small, biconic, usually with a short spire and longer, narrow aperture, columella edentulous in adult specimens, anal sinus weak to moderately prominent, siphonal canal unnotched, protoconch paucispiral and with 1½-2 dome-shaped embryonic whorls. Operculum lacking. Radula with a simple barbless shaft with a constriction a short distance behind the tip, base expanded.

I'follow Emerson & Radwin (1969) and Keen (1971) in considering the presence or absence of columellar folds in this turrid group to be of diagnostic importance. Species without folds on the columella are edentulous in the juvenile as well as adult stage, but in the *Mitrolumna* group, species which always have a biplicate columella in the adult stage, will have an edentulous columella only in the juvenile or immature stage.

Subgenus **Lovellona** Iredale, 1917

Lovellona Iredale, 1917, Proc.Malac.Soc.Lond. 12(6):329. Type species by OD *Conus atramentosus* Reeve, 1849. Recent, Indo-Pacific.

Shell small, coniform, with a short spire and long aperture, columella edentulous, anal sinus absent, protoconch conical and with 2½-2¾ smooth whorls. Operculum absent, radula as in *Mitromorpha.*

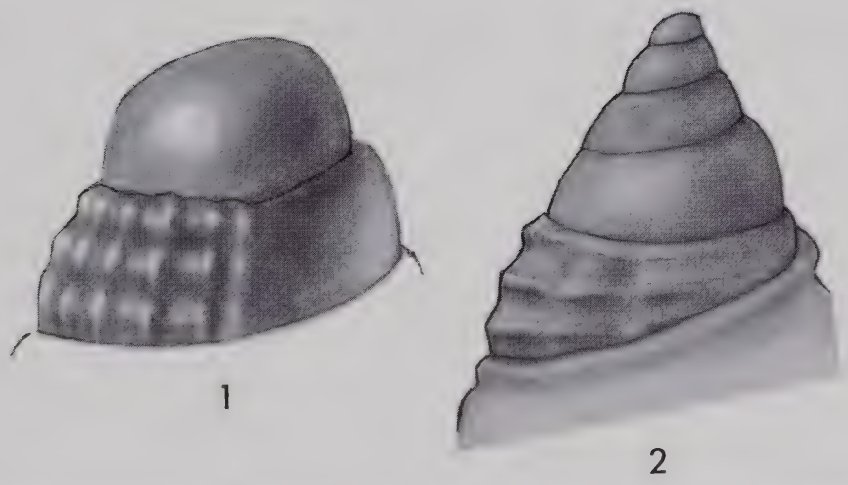
This weak subgenus which appears to be monotypic, differs only slightly in shape from *Mitromorpha* and the protoconch is conical multispiral rather than domed paucispiral as in *Mitromorpha.* Kay (1979) described the protoconch of *M. (L) atramentosa* as "paucispiral, consisting of 1½ smooth, white whorls". Kilburn (1986) gave an SEM photograph of the protoconch of *M. (L.) atramentosa* and described the protoconch as consisting of 2½ embryonic whorls. Specimens which I examined had a conical protoconch of 2½-2¾ smooth embryonic whorls.

The Hawaiian *Lovellona peaseana* Finlay, 1927 (Fig. 1), belongs to *Mitromorpha s.str.* I have not seen the type specimen of *Conus micarius* Hedley, 1912, but specimens seen in collections with this name were worn *M. (L.) atramentosa* (Reeve).

Subgenus **Mitrolumna** Bucquoy, Dautzenberg and Dollfus, 1883

Mitrolumna Bucquoy, Dautzenberg & Dollfus, 1883, Moll.mar.Roussilon 1(3):115, 121. Type specimens by OD *Mitra olivoidea* Cantraine, 1835. Recent, Mediterranean.

Similar to *Mitromorpha* in shell and radular features but the columella of adult specimens of *Mitrolumna* has 2 folds and the protoconch is either paucispiral or multispiral and contains from 1½-3¼ embryonic whorls.



Figs. 1,2. Protoconchs. 1. *Mitromorpha (Mitromorpha) peaseana* Finlay, Hawaiian Is. 2. *M. (Anarithma) metula* (Hinds). Hawaiian Is.

Kilburn's (1986) diagnosis of the protoconch of species of the *Mitrolumna* group was "1½-2 embryonic whorls". However, the protoconch of *M. (M.) olivoidea* (Cantraine) has from 2-2¼ embryonic whorls and the same number can be found in *M. (M.) alba* (Petterd). Drivas & Jay (1986) described *M. (M) kilburni* as having 2½ embryonic whorls and *M. (M). keenae* (Emerson & Radwin 1969), which is an undisputed *Mitrolumna*, has been described as having 3¼ smooth, glassy, translucent-white embryonic whorls (Emerson & Radwin 1969). This is clearly an overlap in the number of embryonic whorls between the *Mitrolumnma* group (1½-3¼) and the *Anarithma* group (2¾-4½) of species. Paucispiral and multispiral protoconchs may be found in *Vexillum s.str.* Röding, 1978, *Pusia* Swainson, 1840, *Nassarius* Dumèril, 1806, and the buccinid *Cantharus (Prodotia)* group, and a generic placement on features of protoconch characters would result in nomenclatorial chaos. For a list of synonyms of the genus-group *Mitrolumna* see Kilburn (1986).

Subgenus **Anarithma** Iredale, 1916

Anarithma Iredale, 1916, Proc.Malac.Soc.Lond. 12(1):27. Type species by M *Clavatula metula* Hinds, 1843. Recent, Indo-Pacific.

Similar to both *Mitromorpha* and *Mitrolumna* in shell and radular features but differs from both in the convex columella with a "V"-shaped notch which resembles the columbellid notch in some Collumbellidae, siphonal canal notched. Operculum absent. Protoconch conical, consisting of 2¾-4½ smooth embryonic whorls (Fig. 2).

In addition to the species mentioned in more detail below, *Columbella fischeri* Hervier, 1899, also belongs to *Anarithma. Columbella (Conidea) perplexa* Schepman, 1911, from the Moluccas, Indonesia is a synonym of *M. (A.) fischeri* and the species should be assigned to *Anarithma* rather than *Lovellona* as suggested by van Benthem-Jutting (1940). Hervier (1899) clearly mentions the "split-tooth" feature of the columella, a character which was not developed in the 3 immature examples of

C.perplexa Schepman. The outer lip in *Anarithma* is usually distinctly denticulate in adult specimens of some species, with the posterior pair of denticles larger than the rest.

Iredale (1916) did not originally designate a type for his new genus *Anarithma* in accordance with Art.67c and 68b of the Code of ICZN (1985). Iredale (1916) listed his new genus as "Anarithma *nov. gen.*" (and not *gen.n., sp.n.*), but mentioned that *Anarithma* is "proposed for the shell commonly known as *Columbella lachryma* Gaskoin". Since an original type designation must be rigidly construed according to the Code of ICZN, Iredale's type selection is only a designation by indication, i.e. by monotypy (Art.68d of ICZN). In introducing his new genus *Zafrona* on the other hand, Iredale (1916) explicitly named *Colombella isomella* Duclos as the "type".

Mitromorpha (Anarithma) metula (Hinds, 1843) (Figs. 2-14)

1843. *Clavatula metula* Hinds, Proc.Zool.Soc.Lond. Pt.11:44; 1844 Hinds, Zool.voy. H.M.S."Sulphur" 2(1):23, pl.7,fig.12.
1845. *Mitra lachryma* Reeve, Conch.Icon. 2:pl.32,fig.258.
1848. *Colombella pamila* Chenu, Illust.Conchyl. pl.22,figs.11,12 (fide Iredale, 1916).
1860. *Cythara garrettii* Pease, Proc.Zool.Soc.Lond. p.147; 1965 Kay, Bull.Brit.Mus.(Nat. Hist.),Suppl.1:32,pl.10,fig.11.
1871. *Columbella (Anachis) pusiola* Dunker, Malak.Blätter 18:157 (fide Iredale, 1916).
1871. *Columbella (Anachis) nana* Dunker, Malak.Blätter 18:157 (fide Thiele, 1924).
1896. *Columbella (Seminella) pacei* Melvill & Standen, J.Conch.8:275, pl.9,fig.5 (non E.A. Smith, 1895).
1897. *Columbella (Seminella) stepheni* Melvill & Standen, J. Conch. 8:407 (nom.subst. pro *Columbella (Seminella) pacei* Melvill & Standen, 1896).
1899. *Columbella lachryma* var. *producta* Hervier, J.Conchyl.47(4):381
1899. *Columbella lachryma* var. *abbreviata* Hervier, *ibid.* 47(4):381 (non Doderlein, 1862; nec Bell, 1871).
1899. *Columbella lachryma* var. *nitescens* Hervier, *ibid.* 47(4):382.
1899. *Columbella sublachryma* Hervier, *ibid.* 47(4):382,pl.14,fig.1.
1899. *Columbella sublachryma* var. *sphaerica* Hervier, *ibid.*47(4):384.
1899. *Columbella stepheni* var. *inornata* Hervier, *ibid.* 47(4):386.
1964. *Columbella dibolos* Bernard, Ann.Natal Mus. 16:17, fig.1f (fide Kilburn, 1986).
1979. *Mitrolumna iki* Kay, Hawaiian mar.shells 64(4):349, fig.115D.
1986.? *Anarithma maesi* Drivas & Jay, La Conchiglia 18(208-209):9, textfig.

TYPE LOCALITY. None *(metula; lachryma* and *pamila);* Hawaiian Is *(garrettii);* Fiji Is *(pusiola* and *nana);* Lifu, Loyalty Is (*pacei; stepheni; producta; abbreviata; nitescens; sublachryma; sphaerica* and *inornata);* Umdloti, Natal, 40 fms. [73 m] *(dibolos);* Kepuhi Pt., Oahu, Hawaiian Is, 60 m *(iki);* Reunion I *(maesi).*

DISTRIBUTION. From S.E. Africa to the Hawaiian Is and the Tuamotu Archipelago.

Type specimens. The holotype of *Clavatula metula* Hinds (*ex*-Lombe-Taylor collection) is in the B.M.(N.H.) No. 1879.2.26.81., length 4.5 mm, width 1.6 mm. The shell has 4½ whorls of teleoconch and a conical protoconch of 4 smooth, white embryonic whorls, sutures with a sutural girdle followed by a concave trough and slanting axial ribs which are nodulose on the posterior end, ribs bisected by spiral

Figs. 3-14. *Mitromorpha (Anarithma) metula* (Hinds). 3-5. Holotype B.M.(N.H.) No. 18792.26.81.; 4.5 mm. 6,7. Lectotype of *Mitra lachryma* Reeve, B.M.(N.H.) No.1962780; 7.8 mm. 10,11. Lectotype of *Columbella (Seminella) stepheni* Melvill & Standen, Manchester Univ.Mus. No.EE-B778; 4.0 mm. 12. Paratype of *Mitrolumna iki* Kay, B.M.(N.H.) No.1982265; 3.2 mm. 13,14. Specimen from Faaone,Tahiti; 7.3 mm.

cords. The anal sinus is distinct, the columella convex and with a "V"-shaped groove. The colouring is straw, with a large brown blotch on the dorsal side of the body whorl (Figs. 3-5).

Three syntypes of *Mitra lachryma* Reeve, are in the B.M.(N.H.) No. 1980107. The illustrated syntype, length 6.8 mm, width 3.1 mm, is here designated as the lectotype. The lectotype has 6 whorls and a worn protoconch, *c.* 20 axial ribs and 3-4 spiral striae on the penultimate and 11 axial ribs and 7 grooves + 13 spiral threads on body whorl, columella "V"-grooved, dorsal side of body whorl with a spreading brown blotch (Figs. 6,7).

The lectotype of *Cythara garrettii* Pease, is in the B.M.(N.H.) No. 1962780, length 7.8 mm, width 3.4 mm. The lectotype has 6¼ whorls and a broken protoconch, a "V"-grooved columella and a brown blotch on the dorsal side of the body whorl (Figs. 8,9).

The illustrated syntype of *Columbella (Seminella) stepheni* Melvill & Standen (and at the same time the syntype of *C. (S.) pacei* Melvill & Standen) is in the Manchester University Museum No. EE B778, length 4.0 mm, width 1.8 mm. This worn syntype, which is here designated as the lectotype, has 5½ whorls and a worn protoconch, 16 axial ribs and 4 spiral striae on the penultimate and 9 axial ribs and 18 spiral striae on the body whorl (Figs. 10,11).

The two very worn syntypes of *Columbella dibolos* Barnard, are in the South African Museum No. A29636 according to Kilburn (1986).

The holotype of *Mitrolumna iki* Kay, is in the Bernice P. Bishop Museum, Honolulu, No. 96824, length 3.5 mm, width 1.5 mm. However, since the holotype was unavailable for examination, I examined 2 paratypes in the B.M.(N.H.) No. 1982265 from the type locality, length of illustrated paratype 3.2 mm (Fig. 12). Paratypes had 3¼ whorls of the teleoconch and 4-4¼ milky-white smooth embryonic whorls, axial ribs which are becoming obsolete towards the outer lip on the body whorl, 3 spiral cords on the penultimate and 8 on the body whorl followed by 7 oblique cords on the siphonal fasciole, columella "V"-grooved, outer lip with blunt denticles posteriorly; orange-brown in colour, some nodules at body whorl suture white.

Kilburn (1986) and Drivas & Jay (1986) discussed *Mitromorpha (Anarithma) metula* (Hinds) from South Africa and Reunion Island. The authors illustrated various colour and sculptural variants and remarked on the high variability of the species. My own examination of about 60 specimens from localities ranging from New Caledonia to the Hawaiian Islands and French Polynesia, confirms the author's findings. Drivas & Jay's (1986) illustration of the typical *metula* form is actually the form *stepheni*, their *iki* form is typical *metula* and their *stepheni* form is the form *lachryma*. The small form of *metula* illustrated by Kilburn (1986, figs.158-160) also occurs on Mururoa Atoll, Tuamotu Archipelago (*leg.* C.Beslu).

Drivas & Jay (1986) gave the number of embryonic whorls in *metula* as 3½-4½. In the 60 specimens of *metula* examined from Pacific localities the size of specimens ranged from 3.0-8.0 mm and the number of embryonic whorls of the protoconch

ranged from 3½-4¼ whorls, which is approximately the same range as reported by Drivas & Jay (1986) from Reunion I.

Drivas & Jay (1986) synoymised *Mitrolumna iki* Kay, 1979, from the Hawaiian Is, with *Mitromorpha (Anarithma) metula* (Hinds). Having compared the 2 paratypes of *iki* with smaller examples of *metula,* I was unable to find any constant differentiating characters between the two species and I agree with the conclusion reached by Drivas & Jay (1986) as to their synonymy.

Thiele (1924) compared specimens of *Columbella nana* Dunker, from the Dunker collection in the Zoological Museum, Humboldt University, Berlin, and pronounced these to be very similar if not identical with *lachryma* Reeve (= *metula* Hinds). Kilburn (1986, figs. 151,152) illustrates the holotype of *Clavatula metula* Hinds, and his illustration shows the protoconch to be partly missing. When I examined the holotype of *Clavatula metula* in 1980, it had a complete protoconch of 4 embryonic whorls (Figs. 3-5).

M. (A.) metula is a very variable species with a much wider range of distribution than the one indicated by Kilburn (1986). It appears to be more common in French Polynesia than other parts of the Pacific.

Mitromorpha (Anarithma) alphonsiana (Hervier, 1899) (Figs. 15-20)

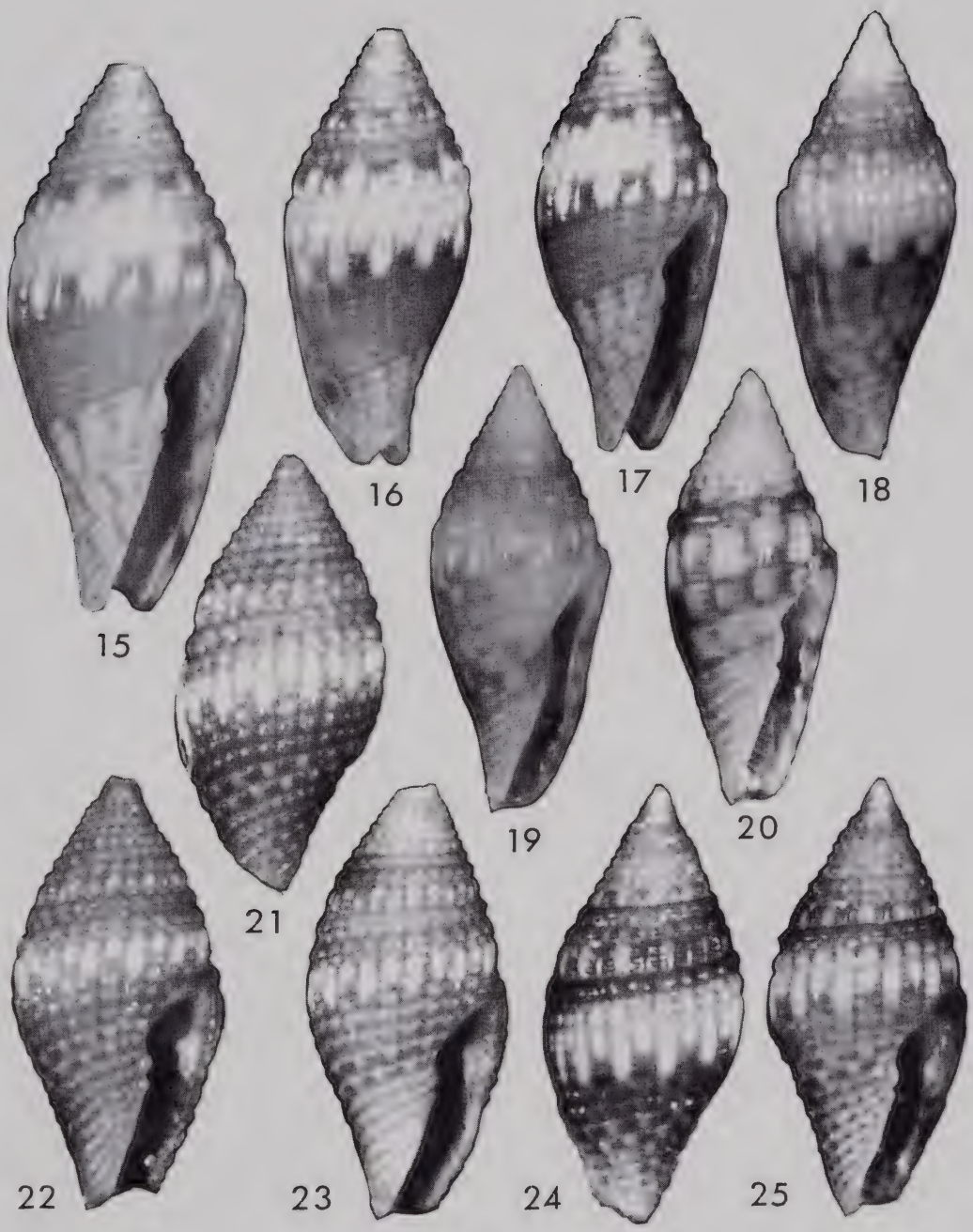
1899. *Columbella alphonsiana* Hervier, J. Conchyl. 47(4):387,pl.14,figs.2,2a.

TYPE LOCALITY. Lifu, Loyalty Islands.

DISTRIBUTION. From New Caledonia to the Tuamoto Archipelago (and the Hawaiian Is ?).

Type specimens. The syntype illustrated by Hervier (1899), which is in the Museum National d'Histoire Naturelle, Paris (no number), length 5.2 mm, width 2.2 mm, is here designated as the lectotype. The lectotype has 4½ whorls of the teleoconch plus a partially preserved protoconch, 18 axial ribs on the body whorl and 17 ribs, 2 rows of nodules and 11 short spiral grooves plus 10 oblique cords on the body whorl, columella with a "V"-shaped groove, aperture long and narrow, outer lip slightly thickened posteriorly, siphonal notch prominent. The base colour is white, 2 sutural rows mauve in colour, body whorl with a broad mauve band which is bordered posteriorly by brown quadrate spots, base of shell with wavy axial brown lines (Figs. 15-17).

Kay (1979) reports the "holotype" of *M. (A.) alphonsiana* as being worn and smooth. Hervier (1899) examined 25 specimens from Lifu but he did not actually select a holotype for the species. The syntype described and illustrated by Hervier (1899) has been deposited in the Museum National d'Histoire Naturelle, Paris, and is carried on the register as a "paratype" (should be "syntype") [see Fischer-Piette 1950]. This specimen, which is here selected as the lectotype, is not worn smooth as stated by Kay (1979), but apart from a broken protoconch is in a good state of preservation with a good sculpture and colour.



Figs. 15-25. 15-20. *Mitromorpha (Anarithma) alphonsiana* (Hervier). 15-17. Lectotype Mus.Nat.d'Hist.Nat.Paris; 5.2 mm. 18-20. Specimens from Mururoa Atoll, Tuamotus. 18,19. 6.4 mm. 20. 4.3 mm. 21-25. *(M. (A.) salisburyi* (Cernohorsky). 21,22. Holotype AIM No. TM-1349; 4.0 mm. 23. Paratype; 4.2 mm. 24,25. Specimen from Mururoa Atoll, Tuamotus; 4.4 mm.

I have examined numerous specimens of *M. (A.) alphonsiana* from Anaa I and Mururoa Atoll, Tuamotus, and the species can be distinguished at a glance from *metula* on the basis of its constant violet-mauve banding and bordering brown quadrate spots. Hervier (1899) described the protoconch as having 2-3 smooth embryonic whorls, and the protoconch is actually conical, multispiral, and consists of 2¾-3 smooth embryonic whorls.

The specimen illustrated by Drivas & Jay (1986) as *alphonsiana* does not appear to be that species. For further discussion see below under *M. (A.) salisburyi* Cernohorsky.

Mitromorpha (Anarithma) salisburyi (Cernohorsky, 1978) (Figs. 21-25)

1978. *Mitrolumna salisburyi* Cernohorsky, Nautilus 92(2):66, figs.10-12; 1978 Cernohorsky, Tropical Pacific mar.shells p.163, pl.58,fig.6.

TYPE LOCALITY. Maile Pt., Oahu, Hawaiian Is, 32 fathoms (59 m).

DISTRIBUTION. From the Hawaiian Is to the Tuamotu Archipelago.

Type specimen. The holotype is in the Auckland Institute and Museum No. TM-1349, length 4.0 mm, width 2.0 mm (Figs. 21,22).

Kay (1979) considered *M. (A.) salisburyi* to be a synonym of *M. (A.) alphonsiana.* Since these two species differ from each other quite appreciably, it is open to speculation of Dr Kay examined the correct type specimen of *alphonsiana* (her description is "worn and smooth" which the lectotype is not) or if *alphonsiana* really does occur in the Hawaiian Islands.

Since the original description of *M. (A.) salisburyi* more specimens have become available from Anaa I and Mururoa Atoll, Tuamotus, where the species is sympatric with *M. (A.) alphonsiana* without any intergrading specimens having been found. The two species differ as follows:

M. (A.) salisburyi is ovate-biconic, with the aperture being about the same height as the spire, the protoconch consists of 3-3½ glassy, golden-brown embryonic whorls, the sculpture is decidedly more nodulose, the fused posterior denticles on the posterior of the outer lip are prominent, the "V"-shaped groove is deeper and the siphonal notch is shallower and almost spout-shaped. The base colour is orange-brown, sutural nodules are rosy-mauve, on the dorsal side the subsutural white axial riblets alternate between long and short, there are 2 narrow rosy-mauve bands on the body whorl and the spiral cords towards the base have small reddish-brown spots.

M. (A.) alphonsiana has a more slender shell with a longer, narrower aperture and shorter spire, a protoconch of 2¾-3 milky-white or glassy-white embryonic whorls, the sculpture is more discreet and not nodulose, the outer lip is slightly constricted centrally, the fused posterior denticles and swelling on the outer lip are less prominent, the "V"-shaped groove is more shallow and the siphonal notch is more prominent. The base colour is white, penultimate and antepenultimate sutural row of

nodules mauve-violet with remaining spire whorls white, body whorl with a broad mauve coloured central band with quadrate brown spots adjoining posterior edge of band, lower half of body whorl with interlacing brown axial lines.

Mitromorpha (Anarithma) dorcas (Koruda & Oyama, 1971) (Fig. 26)

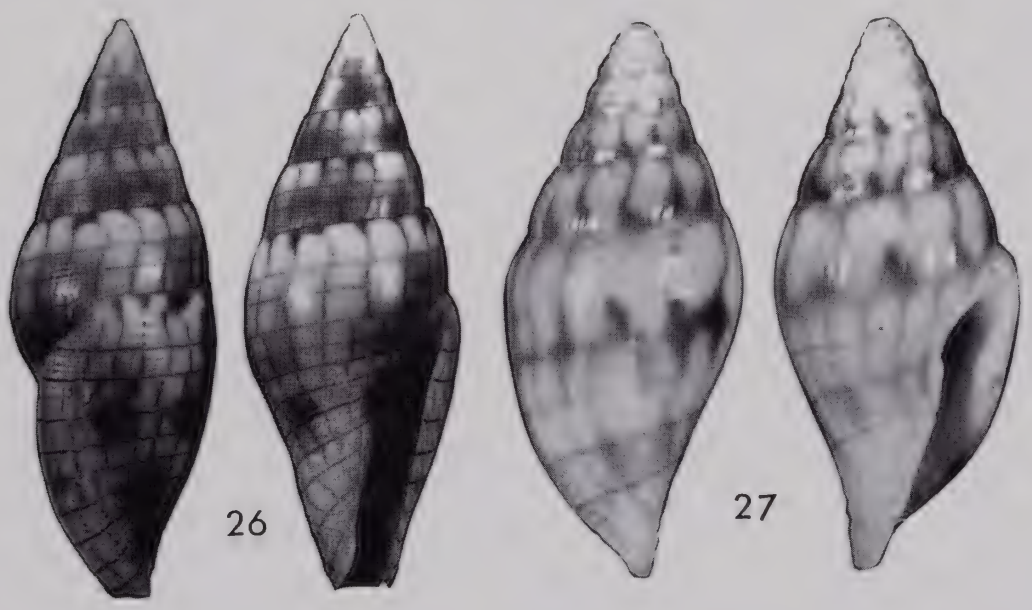
1971. *Anarithma dorcas* Kuroda & Oyama, Sea shells Sagami Bay, p.226, pl.55,fig.7; pl.111,fig.9; 1975 Okutani, Venus:Jap. J.Malac. 33(4):194, pl.10,fig.31; 1986 Springsteen & Leobrera, Shells Philippines p.274, pl.78,fig.4.
1980. *Mitrella celinae* Kosuge, Bull.Inst.Malac.Tokyo 1(3):46,pl.9,figs.10,11.

TYPE LOCALITY. Sagami Bay, Japan *(dorcas);* South China Sea *(celinae).*

DISTRIBUTION. To date known only from Japan and the Philippine Islands.

Shell elongate-biconic, teleoconch with 7 whorls and protoconch with 2-2¼ smooth white embryonic whorls, 2-3 post-embryonic whorls clathrate,later whorls with 2-4 flattish, low spiral cords at posterior of suture, body whorl with finely punctate spiral grooves, aperture with up to 15 lirae in mature specimens, columella with a "V"-shaped groove, siphonal notch distinct. Base colour whitish to pale fawn, ornamented with dark brown spots at sutures and reddish-brown spiral lines and bisecting axial lines and nebulous brown zones.

As has been remarked by Kilburn (1986) this species is rather atypical for the genus *Anarithma* not only in general shape but also in size (up to 25.0 mm) and lack of axial sculpture. A specimen from Mururoa Atoll, Tuamotus (*leg.* C.Beslu) closely



Figs. 26,27. 26. *Mitromorpha (Anarithma) dorcas* (Kuroda & Oyama). Panlao, Bohol, Philippines; 16.3 mm. 27. *M. (A.) spec.* Mururoa Atoll, Tuamotus; 7.1 mm.

resembles *M. (A.) dorcas* in the lack of axial sculpture, strong cords on early whorls, brown lines with darker spots, but the specimen is only 7.1 mm in length (Fig. 27).

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THE MITRIDAE, COSTELLARIIDAE AND NASSARIIDAE (MOLLUSCA: GASTROPODA) RECENTLY DREDGED AT REUNION ISLAND, INDIAN OCEAN, WITH DESCRIPTIONS OF NEW SPECIES

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Abstract. Species of the families Mitridae, Costellariidae and Nassariidae obtained from waters around Reunion Island are enumerated. *Mitra (Nebularia) boucheti* and *Nassarius (Zeuxis) reunionensis* are described as new species, and *Vexillum (Costellaria) albatum* is proposed as a substitute name for the homonymous *Turricula casta* H.Adams, 1872, and *Mitra hastata* Sowerby, 1874. The Miocene fossil species *Nassarius dijki* (K.Martin, 1895) is reported as still living in deep water around Reunion Island.

Dr P. Bouchet, Museum National d'Histoire Naturelle, Paris, has kindly made available to me molluscan material of the families Mitridae, Costellariidae and Nassariidae for examination and report. This material was collected by Dr's P. Bouchet, B. Métivier and A. Warén during cruise 32 of the R.V. "Marion-Dufresne" during 1982 to Reunion I, S.W. Indian Ocean. The material contained new geographical records, new species and a "living fossil" species. All the material examined is housed in the Malacology section of the Museum d'Histoire Naturelle, Paris, France.

The list of species contains the generic, subgeneric and specific name, author and date, Station No., lattitude and longitude, depth in metres and number of specimens in brackets. There is also a supplementary list of Reunion I Mitridae and Costellariidae collected by J. Drivas and M. Jay, and how housed in the Museum National d'Histoire Naturelle, Paris.

Molluscan material of the family Muricidae obtained during the "Marion-Dufresne" cruise 32 has been reported on by Houart (1985a,b) and of the family Buccinidae by Bouchet & Warén (1986).

Family MITRIDAE

Genus **Mitra** Lamarck, 1798

Mitra Lamarck, 1798, Tabl.Encycl.Méth. pl.369. Type species by tautonomy *Voluta mitra* Linnaeus, 1758. Recent, Indo-Pacific. (Opinion 885 of ICZN).

*Rec. Auckland Inst. Mus.*25: 75-85 19 December 1988

Subgenus **Nebularia** Swainson, 1840

Nebularia Swainson, 1840, Treat.Malac. pp. 130,131,319. Type species by SD (Herrmannsen, 1847) *Mitra contracta* Swainson, 1820. Recent, Indo-Pacific.

Mitra (Nebularia) boucheti sp. n. (Figs. 1-4)

Shell small in size, up to 10.8 mm in length (range of adult specimens 7.7 mm — 10.8 mm), fusiformly-elongate, width 36% — 40% of length, teleoconch of 5¼ — 5¾ weakly convex whorls, protoconch multispiral, conical, consisting of 3 + glassy, smooth embryonic whorls, sutures narrowly canaliculate. Regularly sculptured with small, rounded, uniformly sized, close-set nodules which are arranged in 24-31 axial rows and 5-6 spiral rows on the penultimate and from 27-39 axial rows and 11-12 spiral rows on the body whorl, siphonal fasciole with 5-7 oblique cords. Interspaces between nodules very narrow, moderately deep and pitted. Aperture about equal in height to the spire, height 48% — 51% of length, narrow, edge of outer lip thickened and crenulate in adult specimens, perpendicular but constricting towards siphonal canal, columella calloused and with 4 strong oblique folds which decrease in size anteriorly. Base colour white, ornamented with irregular orange-brown zones, sutures occasionally with a few wide-spaced orange-brown spots, anterior third of body whorl with a continuous or interrupted broad orange-brown band, interior of aperture with 2 brown and 1 white.

TYPE LOCALITY. Station DC41, Reunion Island, Indian Ocean 21°21'S & 55°27'E, 75 m.

Holotype. Museum National d'Histoire Naturelle, Paris (no number), length 9.2 mm, width 3.5 mm, height of aperture 4.7 mm (Figs. 1,2).

Paratypes. Paratypes from the type locality in the Museum National d'Histoire Naturelle, Paris, and the Auckland Institute and Museum. A total of 12 specimens have been examined.

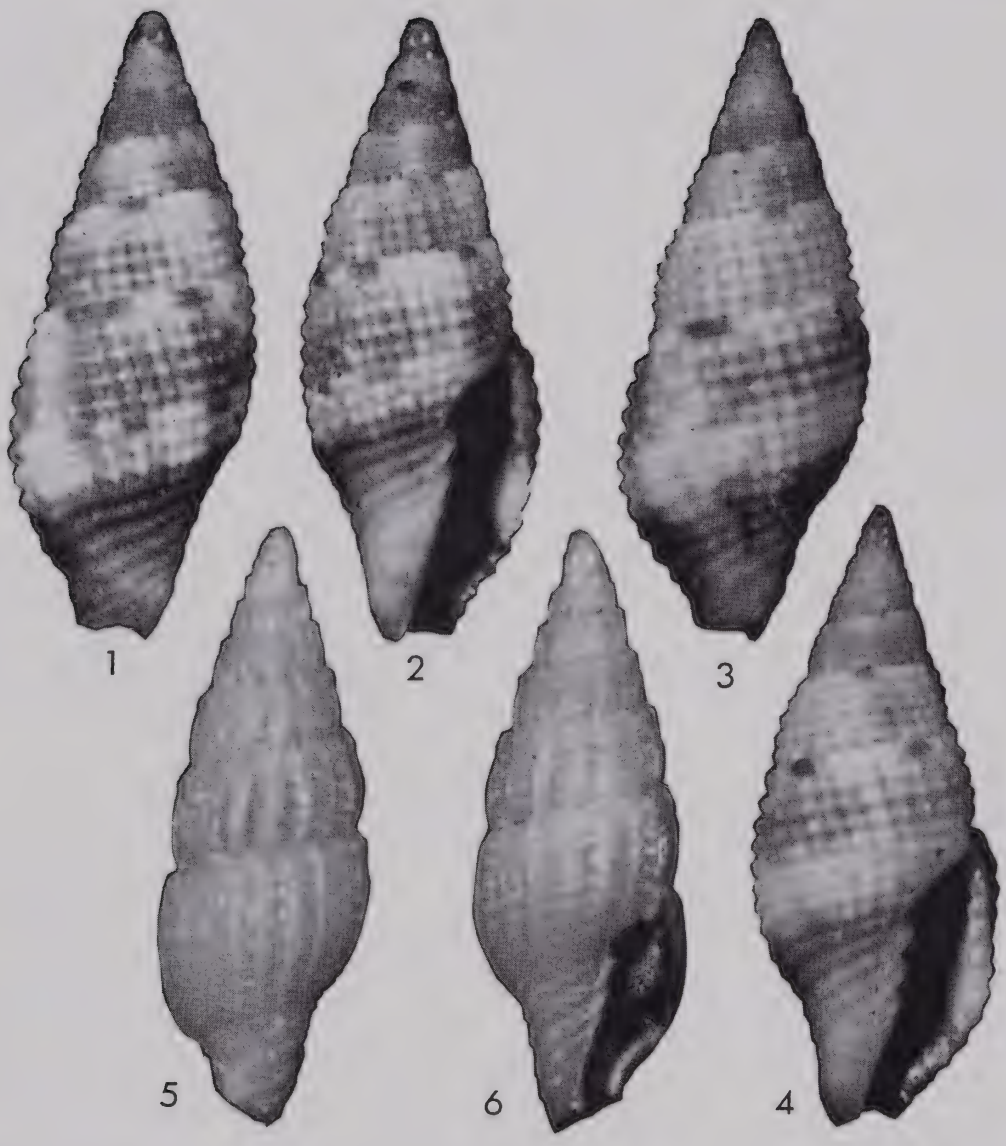
Mitra (Nebularia) boucheti superficially resembles *M. (N.) suturata* Reeve, 1845, but adult specimens of the latter range in size from 20.0 to 40.0 mm, the sculpture consists of spiral cords with narrow pitted interpaces and overriding longitudinal striae, and the protoconch has only 1½-2 embryonic whorls (3 + in *M.boucheti*).

The species is named for Dr P. Bouchet, Museum National d'Histoire Naturelle, Paris, a member of the "Marion-Dufresne" 1982 expedition, for his malacological contributions on Mediterranean-Atlantic Mollusca.

Family COSTELLARIIDAE

Genus **Vexillum** Röding, 1798

Vexillum Röding, 1978, Mus.Bolten. p.138. Type species by SD (Woodring, 1928) *V.plicatum* Röding, 1798 = *Voluta plicaria* Linnaeus, 1758. Recent, Indo-Pacific.



Figs. 1-6. 1-4. *Mitra (Nebularia) boucheti* sp. n. Reunion I. 1,2. Holotype MNHNP (no number), 9.2 mm. 3,4. Paratype, 10.2 mm. 5,6. *Vexillum (Costellaria) albatum* nom. n. Reunion I, 210-227 m; 6.8 mm.

Subgenus **Costellaria** Swainson, 1840

Costellaria Swainson, 1840, Treat.Malac. pp.130,320. Type species by M *Mitra rigida* Swainson, 1821 = *M.semifasciata* Lamarck, 1811. Recent, Indo-Pacific.

Vexillum (Costellaria) albatum nom. n. (Figs. 5,6)

1872. *Turricula (Thala) casta* H.Adams, Proc.Zool.Soc.Lond. p.9, pl.3,fig.2.
1874. *Mitra hastata* Sowerby, Thes.Conchyl. 4:35,pl.27 (378), fig.620 [nom.subst.pro *Turricula (Thala) casta* H.Adams, 1872] (non *Mitra hastata* Karsten, 1849).

TYPE LOCALITY. Red Sea.

DISTRIBUTION. From the Red Sea and the Persian Gulf to Hawaii and the Society Is, French Polynesia, from 20 — 400 m.

Reunion I record: St.DC126, 20°52'S & 55°38'E, 110 m (2); St.CP57, 21°05'S & 55°11'E, 210-227 m (27); St.DR47, 21°23'S & 55°37'E, 205-215 m (1).

Type specimens. The type specimen of *Turricula casta* H.Adams (which is also the type of *Mitra hastata* Sowerby), bears the British Museum (N.H.) registration No. 1872.4.9.9., however, the type itself has not been located in the Mollusca section of the Museum (K.Way, in litt. 25-2-1987). I have also been unable to locate the type specimen on my two visits to the British Museum (N.H.) in 1968 and 1973. The species, however, is clearly recognisable from the original type-figure and description.

Sowerby (1874) considered *Turricula casta* H.Adams,1872,to be a homonym of the well established *Voluta casta* Gmelin, 1791 (= *Scabricola (Swainsonia) casta*) and proposed the substitute name *Mitra hastata*. Although *Turricula casta* H.Adams is not a secondary homonym according to modern taxonomic rules, the taxon is permanently invalid according to article 59(b) since it has been replaced as a homonym prior to 1961 (Code of ICZN, 1985). Sowerby's substitute name *Mitra hastata* is also taxonomically unavailable since it is a primary homonym of *Mitra hastata* Karsten, 1849, which is a *Vexillum (Costellaria)* species from the Chattian, Upper Oligocene of the North Sea Basin.

Family NASSARIIDAE

Genus **Nassarius** Dumèril, 1806

Nassarius Dumèril, 1806, Zool. Analytique p.166. Type species by SM (Froriep, 1806) *Buccinum arcularia* Linnaeus, 1758. Recent, Indo-Pacific.

Subgenus **Zeuxis** H. & A. Adams, 1853

Zeuxis H. & A. Adams, 1853, Gen.Rec.Moll. 1:119. Type species by SD (Cossmann, 1901) *Buccinum taenia* Gmelin, 1791 = *B.olivaceum* Bruguière, 1789. Recent, Indo-Pacific.

Nassarius (Zeuxis) reunionensis sp. n. (Figs. 7-12)

Shell moderately small, up to 23.2 mm in length (adult specimens range from 18.5-23.3 mm), elongate-ovate, width 47%-53% of length, light in weight, teleoconch of 6½-7¼ convex whorls, protoconch of 2½-2¾ translucent-white embryonic whorls, last turn of protoconch with a fine carina. Early spire whorls angulate and sculptured with angulate axial ribs and a double row of sutural nodules, sutures distinct but not canaliculate; later whorls with less angulate axial ribs which number from 21-36 on the penultimate and from 21-40 on the body whorl, axials thinner and more crowded towards the back of the outer lip. Spiral sculpture consists of a double row of sutural nodules separated by a shallow concave trough, followed by spiral striae which are mostly confined to the interspaces of axial ribs on the penultimate whorl but reach the summits of the axial ribs on the body whorl; spiral striae number from 5-9 on the penultimate and from 11-16 on the body whorl, last 5 anterior spiral striae wide-spaced, siphonal fasciole with 4-7 oblique cords. Aperture moderately wide, equal in height or slightly shorter than the spire, height 45%-50% of length, outer lip with 5-10 denticles which extend as short lirae into the aperture, anterior edge of outer lip with a few blunt denticles. Columella calloused and with 2-12 short denticles, parietal denticle prominent, siphonal notch distinct. White to cream in colour, spire whorls with 2 narrow orange-brown spiral bands, body whorl with 2 broad orange-brown bands, aperture porcellaneous-white. Operculum corneous, elongate-ovate and serrate on margins.

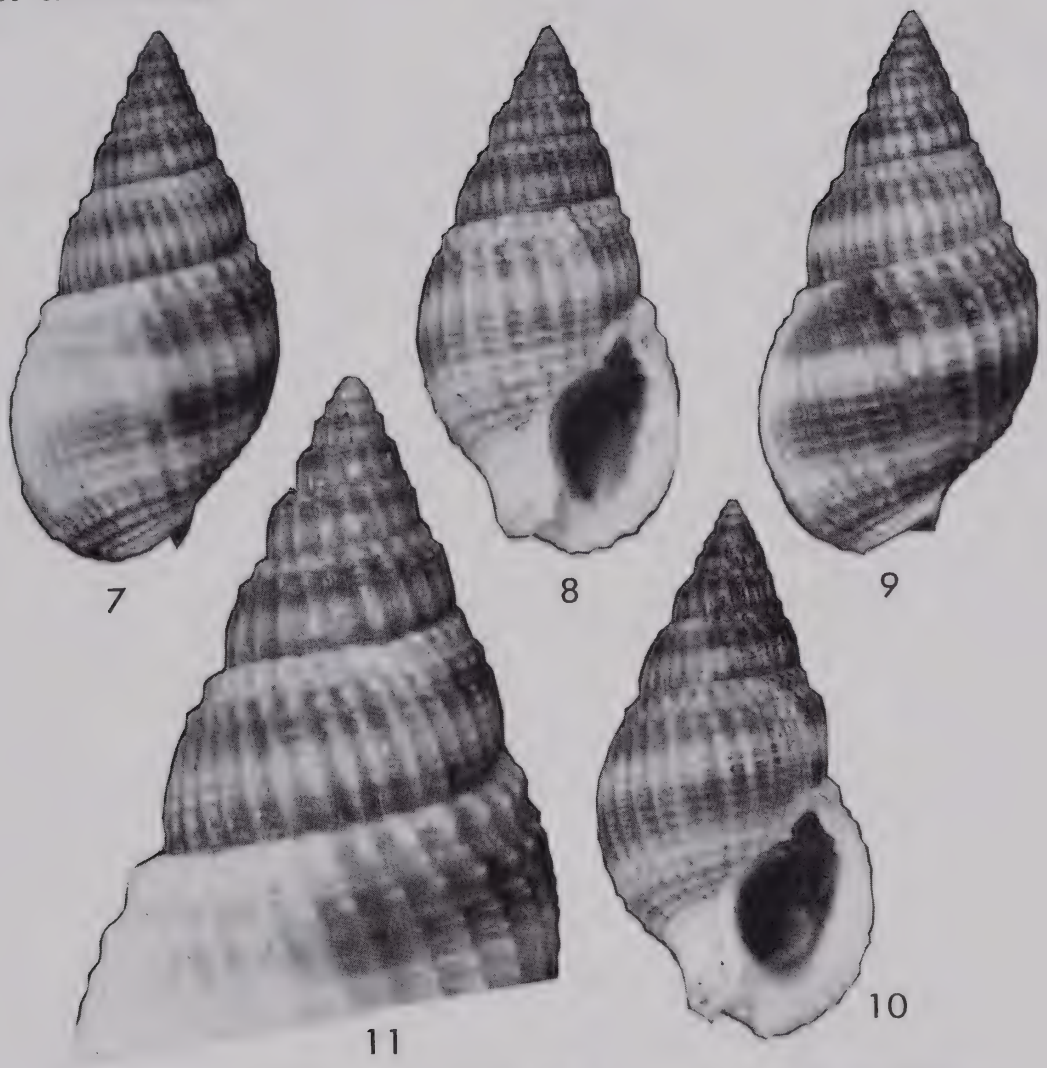
Radula typically nassarine, odontophore 4.6 — 5.1 mm in length, numbering 59 or 61 rows of teeth + 3 nascentes. Rachidian with 12-13 denticles, laterals simple and bicuspid (Fig. 12).

TYPE LOCALITY. St.CP129, Reunion I, Indian Ocean, 20°51'S & 55°36'E, 290-300m.

Holotype. Museum National d'Histoire Naturelle, Paris (no number), length 20.2 mm, width 9.5 mm, height of aperture 9.6 mm (Figs. 7,8).

Paratypes. St.CP129, 20°51'S & 55°36'E, 290-300 m (32) [type locality]; St.70, 21°23'01"S & 55°29'03"E, 700-730 m (1); St.88, 55-60 m (7); St.CP130, 20°51'S & 55°37'E, 300-380 m (2); St.DC27, 21°22'S & 55°47'E, 290-310 m (1); St.DC128, 20°51'S & 55°36'E, 280-340 m (16); St.DC176, 21°02'S & 55°11'E, 165-195 m (1); St.DR47, 21°23'S & 55°37'E, 205-215 m (1); St.DS131, 20°51'S & 55°37'E, 345-375 m (5); Baie de la Possession, Reunion I, 140 m, in shrimp pots (2). Paratypes in the Museum National d'Histoire Naturelle, Paris, the Auckland Institute and Museum and coll. O.K. McCausland, San Francisco, California. Total of 69 specimens examined.

The species is superficially similar to *Nassarius (Zeuxis) crematus* (Hinds,1844), but this species has a more nodulose spiral sculpture, lacks the double row of sutural nodules and intervening concave trough, has a wrinkled columella and more numerous, i.e. 3-3½embryonic whorls. One other species which has a double row of sutural nodules separated by a concave trough is *N. (Z.) protrusidens* (Melvill, 1918). This species also has a similar-sized protoconch but the shell is very solid, the spire long and aperture short and narrow, with fewer denticles on the outer lip, and the overall sculpture is distinctly nodulose. *N. (Z.) protrusidens* is sympatric with *N. (Z.) reunionensis* on Reunion I.



Figs. 7-11. *Nassarius (Zeuxis) reunionensis* sp. n. Reunion I. 7,8. Holotype MNHNP (no number), 20.2 mm. 9,10. Paratype, 20.4 mm. 11. Enlargement of spire whorls of holotype.

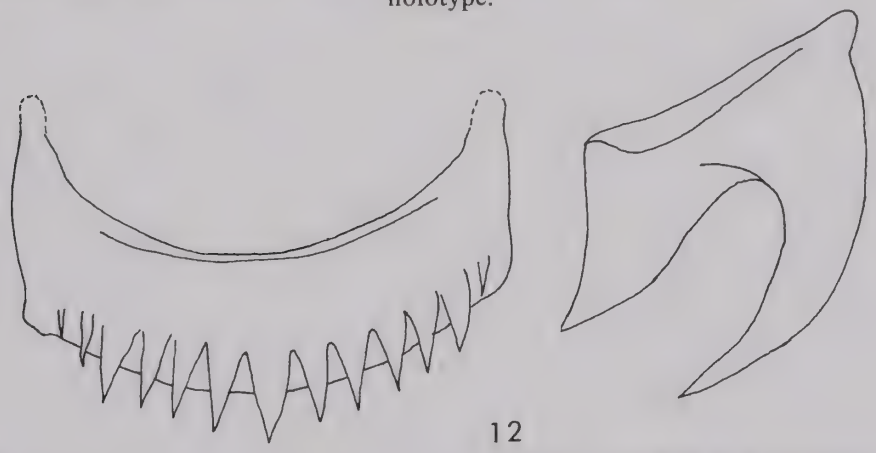


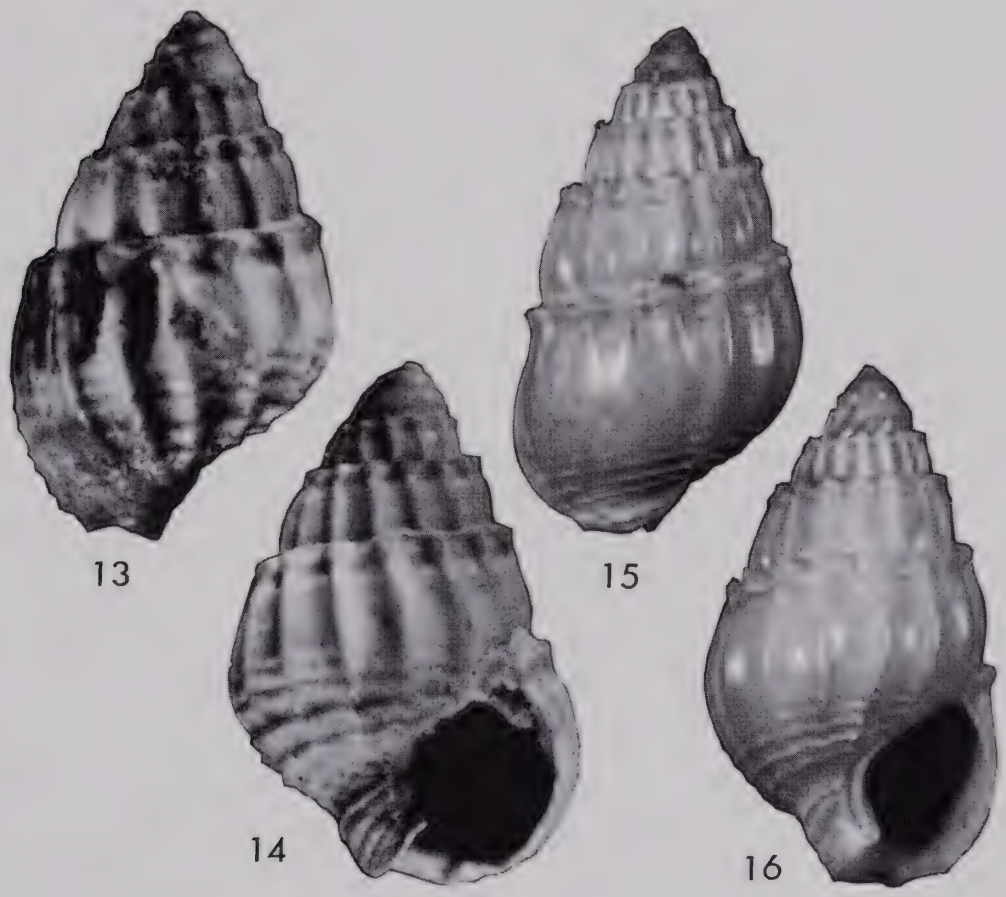
Fig. 12. *Nassarius (Zeuxis) reunionensis* sp. n. Reunion I. Half-row of radula.

Nassarius (Zeuxis) dijki (K. Martin, 1895) (Figs. 13-16)

1895. *Nassa (Niotha) dijka* K.Martin, Samml.geol.Reichs.-Mus. Leiden, N.F.1:109, pl,17,figs.244,244a,b.
1919. *Nassa dijki* K.Martin, Palaeozool.Kennt.Java p.83; 1931 van der Vlerk, Leidsche geol.Meded. 5:233.
1984. *Nassarius (Zeuxis) dijki* (K.Martin), Cernohorsky, Bull. Auckland Inst.Mus. No.14:159, figs. 132,133.

TYPE LOCALITY. Borehole at Grissee, depth 616-645 m, Soerabaja, Java, L.Miocene of Indonesia.

Reunion I record: St.DC10, 21°13'S & 55°52'E, 930-980 m (13); St.DC31, 21°23'S & 55°47'E, 750-880 m (1); St.DC112, 20°53'S & 55°09'E, 740-780 m (53); St.DC134, 20°51'S & 55°39'E, 650-750 m (3); St.DR63, 21°10'S & 55°09'E, 825-890 m (5); St.DS142, 20°50'S & 55°36'E, 480-675 m (4).



Figs. 13-16. *Nassarius (Zeuxis) dijki* (K.Martin). 13,14. Lectotype Rijksmuseum van Geologie en Mineralogie, Leiden RGM-9481; 5.4 mm. 15,16. Reunion I, 825-890 m, 6.8 mm.

The species was previously known only from fossil deposits of the Indonesian Miocene and this is the first record of living specimens. The species is characterised by the lack of spiral sculpture except for spiral threads on the anterior half of the body whorl (Figs. 13-16).

List of Reunion I Mitridae

Mitra cf. *triplicata* v.Martens, 1904: St.DC134, 20°51'S & 55°39'E, 650-750 m (1).
Mitra deynzeri Cernohorsky, 1980: St.DC2, 21°12'S & 55°49'E, 160-190 m (1).
Mitra (Nebularia) tabanula Lamarck, 1811: St.DC85, 21°00'S & 55°15'E, 58-70 m (2).
Ziba interlirata (Reeve, 1844): St.DC85, 21°00'S & 55°15'E, 58-70 m (3); St.DR154, 21°01'S & 55°44'E, 45 m (5); St.56, 21°05'S & 55°12'E, 170-225 m (3); St.DR47, 21°23'S & 55°37'E, 205-215 m (3); St.DC41, 21°21'S & 55°27'E, 75 m (25); St.DC126, 20°52'S & 55°38'E, 110 m (6); St.DC124, 20°52'S & 55°37'E, 40 m (2); St.DC86, 20°59'S & 55°15'E, 75-90 m (44); St.DC128, 20°51'S & 55°36'E, 280-340 m (1).
Z. cf. *rehderi* (Webb, 1958): St.DC41, 21°21'S & 55°27'E, 75 m (6); St.DC56, 21°05'S & 55°12'E, 170-225 m (5).
Ziba sp.: St.DC128, 20°51'S & 55°36'E, 280-340 m (1).
Domiporta carnicolor (Reeve, 1844), St.DC85, 21°00'S & 55°15'E, 58-70 m (2).
D.filaris (Linnaeus, 1771): St.DC124, 20°52'S & 55°37'E, 40 m (4); St.DC86, 20°59'S & 55°15'E, 75-90 m (1).
D.rufilirata (Adams & Reeve, 1850): St.DC54, 21°06'S & 55°13'E, 80-83 m (1).
Neocancilla clathrus (Gmelin, 1791): St.DC124, 20°52'S & 55°37'E, 40 m (4); St.DC41, 21°21'S & 55°27'E, 75 m (5).
Scabricola coriacea (Reeve, 1845), St.DC56, 21°05'S & 55°12'E, 170-225 m (1); St.DC41, 21°21'S & 55°27'E, 75 m (9); St.DR47, 21°23'S & 55°37'E, 205-215 m (2).
S.desetangsii (Kiener, 1838): St.DC56, 21°05'S & 55°12'E, 170-225 m (23); St.DC124, 20°52'S & 55°37'E, 40 m (1).

List of Reunion I Costellariidae

Vexillum (Costellaria) acuminatum (Gmelin, 1791): St.DC896, 20°59'S & 55°15'E, 75-90 m (1).
V. (C.) angustissimum (E.A.Smith, 1903): St.DC124, 20°52'S & 55°37'E, 40 m (1).
V. (C.) bipartitum (E.A.Smith, 1884): St.DC41, 21°21'S & 55°27'E, 75 m (7).
V. (C.) diutenerum (Hervier, 1897): St.FA 25, 21°22'S & 55°46'E, 90-95 m (1); St.DC41, 21°21'S & 55°27'E, 75 m (10); St.DC85, 21°00'S & 55°15'E, 58-70 m (28); St.DC86, 20°59'S & 55°15'E, 75-90 m (1); St.DR47, 21°23'S & 55°37'E, 205-215 m (3).
V. (C.) duplex Cernohorsky, 1982: St.DC106, 20°48'S & 55°05'E, 1,710-1,730 m (1); St.DS139, 20°47'S & 55°38'E, 1,575-1,600 m (1); St.CP105, 20°47'S & 55°04'E, 1,740-1,850 (2).
V. (C.) filistriatum (Sowerby, 1874): St.CP43, 21°21'S & 55°27'E, 73-77 m (1); St.DC41, 21°21'S & 55°27'E, 75 m (1); St.DC85, 21°00'S & 55°15'E, 58-70 m (5).
V. (C.) festum (Reeve, 1845): St.DC85, 21°00'S & 55°15'E, 58-70 m (10).
V. (C.) malcolmense (Melvill &Standen, 1901): St.DC86, 20°59'S & 55°15'E, 75-90 m (1).
V. (C.) micra Pilsbry, 1921: St.CP97, 19°41'S & 54°09'E, 55 m (1); St.CP43, 21°21'S & 55°27'E, 73-77 m (1).
V. (C.) mirabile (A.Adams, 1853): St.DR47, 21°23'S & 55°37'E, 205-215 m (1); St.DC85, 21°00'S & 55°15'E, 58-70 m (2); St.DC126, 20°52'S & 55°38'E, 110 m (2); St.DC86, 20°59'S & 55°15'E, 75-90 m (1); St.DC41, 21°21'S & 55°27'E, 75 m (1).
V. (C.) nodospiculum Cernohorsky, 1970: St.DC26, 21°22'S & 55°47'E, 310 m (1); St.DC128, 20°51'S & 55°36'E, 280-340 m (13). This is the first record of the species outside the Philippine Islands.

V. (C.) obeliscus (Reeve, 1844): St.DC85, 21°00'S & 55°15'E, 58-70 m (38);St.DC86, 20°59'S & 55°15'E, 75-90 m (7); St.DC41, 29°21'S & 55°27'E, 75 m (1).
V. (C.) radius (Reeve, 1845): St.DC86, 20°59'S & 55°15'E, 75-90 m (1); St.DR47, 21°23'S & 55°37'E, 205-215 m (5); St.DR154, 21°01'S & 55°44'E, 45 m (2); St.DC128, 20°51'S & 55°36'E, 280-340 m (2); St.DC41, 21°21'S & 55°27'E, 75 m (23); St.DC28, 21°00'S & 55°15'E, 58-70 m (73); St.DC54, 21°06'S & 55°13'E, 80-83 m (4).
V. (C.) sculptile (Reeve, 1845): St.CP57, 21°05'S & 55°11'E, 210-227 m (4); St.DC41, 21°21'S & 55°27'E, 75 m (3); St.DC128, 20°51'S & 55°36'E, 280-340 m (6); St.DC121, 20°53'S & 55°14'E, 290-340 m (6); St.DR47, 21°23'S & 55°37'E, 205-215 m (1); St.DC124, 20°52'S & 55°37E, 40 m (1); St.DC2, 21°12'S & 55°49'E, 160-190 m (1); St.CP60, 21°03'S & 55°10E, 460-490 m (1).
Vexillum (Costellaria) sp.: St.DC176, 21°02'S & 55°11'E, 165-195 m (1).
V. (Pusia) microzonias (Lamarck, 1811): St.DC85, 21°00'S & 55°15'E, 58-70 m (4).
V. (P.) osiridis (Issel, 1869): St.DC85, 21°00'S & 55°15'E, 58-70 m (1).
V. (P.) plurinotatum (Hervier, 1897): St.DC85, 21°00'S & 55°15'E, 58-70 m (1).
V. (P.) rubrum (Broderip, 1836): St.DC85, 21°00'S & 55°15'E, 58-70 m (4).
V. (P.) salisburyi Cernohorsky, 1976: St.DC85, 21°00'S & 55°15'E, 58-70 m (45); St.DC86, 20°59'S & 55°15'E, 75-90 m (2); St.DC126, 20°52'S & 55°38'E (7).
V. (P.) suavis (Souverbie, 1875): St.DC1, 21°13'S & 55°49'E, 150-160 m (1); St.DC27, 21°22'S & 55°47'E, 290-310 m (1 questionable sp.).
V. (P.) tusum (Reeve, 1845): St.DC1, 21°13'S & 55°49'E, 150-160 m (1); St.DC124, 20°52'S & 55°37'E, 40 m (1); St.DC10, 21°13'S & 55°52'E, 930-980 m (1).
V. (P.) unifascialis (Lamarck, 1811): St.DC2, 21°12'S & 55°49'E, 160-190 m (1).
Thala maxmarrowi Cernohorsky, 1980: St.DC85, 21°00'S & 55°'E, 58-70 m (12); St.DC86, 20°59'S & 55°15'E, 75-90 m (1); St.DC126, 20°52'S & 55°38'E, 110 m (2); St.DC176, 21°02'S & 55°11'E, 165-195 m (1); St.DC56, 21°05'S & 55°12'E, 170-225 m (1). This is the first record of the species outside the Ryukyu Islands.

List of Reunion I Nassariidae

Species are arranged alphabetically and are assigned to *Nassarius s. lato* and *Cyllene.*

Nassarius acuminatus (Marrat, 1880): St.DC126, 20°52'S & 55°38'E, 110 m (1).
N.agapetus (Watson, 1882): St.DC56, 21°05'S & 55°12'E, 170-225 m (9).
N.castus (Gould, 1850): St.DC126, 20°52'S & 55°38'E, 110 m (15); St.DC159, 20°59'S & 55°45'E, 757-771 m (1); St.DC86, 20°59'S & 55°15'E, 75-90 m (1).
N.conoidalis (Deshayes in Belanger, 1832): St.DR154, 21°01'S & 55°44'E, 45 m (38); St.DC86, 20°59'S & 55°15'E, 75-90 m (18).
N.crebricostatus (Schepman, 1911): St.CP129, 20°51'S & 55°36'E, 290-300 m (1); St.DC58, 21°03'S & 55°10'E, 450 m (1); St.DC128, 20°51'S & 55°36'E, 280-340 m (36); St.CP130, 20°51'S & 55°37'E, 300-380 m (1); St.DC131, 20°51'S & 55°37'E, 345-375 m (10); St.DC121, 20°53'S & 55°14'E, 290-340 m (19).
N.delicatus (A.Adams, 1852): St.DC86, 20°59'S & 55°15'E, 75-90 m (1).
N.dilutus (E.A.Smith, 1899): St.DC106, 20°48'S & 55°05'E, 1710-1730 m (1); St.DC14, 21°16'S ¢ 56°07'E, 2,085-2,175 m (1).
N.glans (Linnaeus, 1758): St.DC85,21°00'S & 55°15'E, 58-70 m (1).
N.himeroessus (Melvill & Standen, 1903): St.DC56, 21°05'S & 55°12'E, 170-225 m (2); St.DC121, 20°53'S & 55°14'E, 290-340 m (1).
N.labiatus (A.Adams, 1853): St.DR47, 21°23'S & 55°37'E, 205-215 m (3).
N.multipunctatus (Schepman, 1911): St.DC56, 21°05'S & 55°12'E, 170-225 m (3).
N.pauperus (Gould, 1850); St.DC41, 21°21'S & 55°27'E, 75 m (5); St.DR47, 21°23'S & 55°37'E, 205-215 m (5); St.CP97, 19°41'S & 54°09'E, 55 m (4); St.DC85, 21°00'S & 55°15'E, 58-70 m (31); St.DC86, 20°59'S & 55°15'E, 75-90 m (2).

N.protrusidens (Melvill, 1918): St.DC126, 20°52'S & 55°38'E, 110 m (4); St.DC131, 20°51'S & 55°37'E, 345-375 m (1); St.DC2, 21°12'S & 55°49'E, 160-190 m (2).
N.splendidulus (Dunker, 1846): St.DC45, 21°06'S & 55°13'E, 80-83 m (1); St.DC1, 21°13'S & 55°49'S, 150-160 m (1); St.DR47, 21°23'S & 55°37'E, 205-215 m (2); St.DC124, 20°52'S & 55°37'E, 40 m (24); St.DC86, 20°59'S & 55°15'E, 75-90 m (2); St.DC56, 21°05'S & 55°12'E, 170-225 m (6); St.DC126, 20°52'S & 55°38'E, 110 m (9); St.DC85, 21°00'S & 55°15'E, 58-70 m (2); St.DR90, 19°45'S & 54°09'E, 65 m (2).
N.subtranslucidus (E.A.Smith, 1903): St.DC56, 21°05'S & 55°12'E, 170-225 m (10).
N.vidalensis (Barnard, 1959): St.DC56, 21°05'S & 55°12'E, 170-225 m (21).
Cyllene concinna A.Adams, 1851: St.DR154, 21°01'S & 55°44'E, 45 m (8); St.DC124, 20°52'S & 55°37'E, 40 m (61); St.DC128, 20°51'S & 55°36'E, 280-340 m (1); St.DR47, 21°23'S & 55°37'E, 205-215 m (1); in muddy black sand, 50 m (2 sp. — *leg.* Drivas & Jay).

Supplementary list of Reunion I Mitridae and Costellariidae from the Drivas and Jay collection, deposited in the Museum National d'Histoire Naturelle, Paris

Family Mitridae

Mitra coffea Schubert & Wagner, 1829: (4).
M.guttata Swainson, 1824: in 60 m (1).
Mitra (Nebularia) cucumerina Lamarck, 1811: in lagoon (3)..
M. (N.) tabanula Lamarck, 1811: (3).
Mitra (Strigatella) acuminata Swainson, 1824: (3).
Ziba interlirata (Reeve, 1844): in 60 m (1).
Z.rehderi (Webb, 1958): in 66 m (1).
Domiporta granatina (Lamarck, 1811): in sand, 12 m (1).
Pterygia crenulata (Gmelin, 1791): in 12 m (1).

Family Costellariidae

Vexillum (Vexillum) intermedium (Kiener, 1838): in 44 m (1).
Vexillum (Costellaria) acupictum (Reeve, 1844): in 12 m (1); in sand, 42 m (1); in 70 m (1).
V. (C.) corbicula (Sowerby, 1870): under coral, 50-70 m (1).
V. (C.) echinatum (A.Adams, 1853): in sand, 37 m (1); in 40 m (1).
V. (C.) exasperatum (Gmelin, 1791): in 70-75 m (3).
V. (C.) micra Pilsbry, 1921: in 12 m (1); in muddy black sand, 60-70 m (2).
V. (C.) modestum (Reeve, 1845): in muddy black sand, 70 m (1).
V. (C.) obeliscus (Reeve, 1844): in muddy black sand, 60 m (1).
V. (C.) pacificum (Reeve, 1845): (2).
V. (C.) roseum (Broderip, 1836): under rock, 12 m (1).
V. (C.) takakuwai Cernohorsky & Azuma, 1974: in 100 m (1).
V. (C.) unifasciatum (Wood, 1828): on coral, 63 m (1).
Vexillum (Pusia) turben (Reeve, 1844): (1).
V. (P.) unifascialis (Lamarck, 1811): in 12 m (2); on coral, 12 m (2).
Thala mirifica (Reeve, 1845): in 12 m (1).

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RECORDS OF BIRDS AND REPTILES FROM TONGA

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Abstract. Records are presented of birds seen, and reptiles collected, in July 1988 on Tongatapu and three islands of the Ha'apai group (Lifuka, Foa and Lofanga), Kingdom of Tonga. Sightings of birds on Tongatapu, 'Eua, Vava'u and Niuatoputapu by A.P. and E.F. Fabian are given, as are a few records of birds and reptiles based on specimens in Auckland Museum collected before 1988. The White-faced Heron *Ardea novaehollandiae* is reported from Tonga for the first time, and European Starlings *Sturnus vulgaris* seen on Foa are the first record of that species from the Ha'apai group. Blue-crowned Lorikeets *Vini australis,* now rare in Tonga, were seen on Lofanga and Niuatoputapu.

Very little has been published on the distribution of birds and reptiles in the Tongan archipelago. The few recent papers are by Dhondt (1976), Rinke (1986a, 1986b, 1987) and Gill (1987). In this paper I have assembled distributional records based on the following:

(1) Observations of birds and reptiles, and collections of reptiles, made by me in July 1988. I spent 10 days on Tongatapu, and 14 days in the Ha'apai group — the latter comprising 6 days on Lofanga, and the rest on Lifuka with day excursions to Foa. Where no observer is given the record is by me at this time. The records of birds and reptiles on the three Ha'apai islands are summarised in Tables 1 and 2. The reptiles collected are in the Auckland Museum collection and the registration numbers (prefix H) are given here.

(2) Specimens of birds (prefix B) and reptiles (prefix H) in the Auckland Museum collection, not collected by me.

(3) Observations of birds on Tongatapu, 'Eua, Vava'u and Niuatoputapu in 1987 and 1988 kindly provided by Mr Paul Fabian (British High Commissioner, Nuku'alofa) and Mrs Eryll Fabian.

Where weights and snout-vent lengths (SVL) of lizards are given, I took these in July 1988 from freshly killed specimens. Morphometrics of adults of three commonly collected lizards are summarised in Table 3.

All sightings of dark noddies *(Anous stolidus* or *A. minutus)* and most sightings of frigatebirds *(Fregata minor* or *F. ariel)* were ignored as the birds were not seen closely enough to identify the species.

Table 1. Summary of birds seen on three Ha'apai islands, July 1988.

	Lifuka	Foa	Lofanga
Reef Heron	+	+	+
Grey Duck		+	
Banded Rail	+	+	+
Purple Swamphen		+	
Least Golden Plover	+	+	+
Wandering Tattler	+	+	
Crested Tern	+	+	
Many-coloured Fruit-dove	+		
Crimson-crowned Fruit-dove	+	+	+
Blue-crowned Lorikeet			+
Collared Kingfisher	+	+	+
Welcome Swallow			+
Polynesian Triller	+	+	
Polynesian Starling	+	+	+
European Starling		+	
Wattled Honeyeater	+		+

Table 2. Summary of reptiles recorded on three Ha'apai islands, July 1988.

	Lifuka	Foa	Lofanga
Gehyra mutilata	+		
Gehyra oceanica		+	
Lepidodactylus lugubris	+	+	+
Cyrtodactylus pelagicus	+		
Cryptoblepharus poecilopleurus			+
Emoia cyanura	+	+	+
large skink ?*Emoia*		+	
Chelonia mydas			+

Table 3. Snout-vent lengths (mm) and weights (g) of three species of lizards, Ha'apai group only, July 1988.

	mean	s.d.	n	range
Snout-vent length				
Gehyra mutilata	45.0	5.39	5	38-50
Lepidodactylus lugubris	39.1	3.26	12	33-44
Emoia cyanura	46.3	1.98	8	44-49
Weight				
G. mutilata	2.28	0.585	4	1.4-2.6
L. lugubris	1.42	0.358	10	0.9-1.9
E. cyanura	1.87	0.413	6	1.3-2.4

BIRDS

Black-winged Petrel (Lafu) *Pterodroma nigripennis*
Lofanga: B1338, in spirit, coll. S.P. Fanua 14 January 1987.

White-tailed Tropicbird (Tavake) *Phaethon lepturus*
Tongatapu: Several at Hufangalupe Beach and about nearby cliffs. *Niuatoputapu:* Seen August 1988 (Fabian).

Brown Booby (Ngutulei) *Sula leucogaster*
Tongatapu: Seen singly off Fafa I. July 1987, February 1988 and September 1988 (Fabian). One off Hufangalupe Beach July 1988 (Fabian). *'Eua:* Nesting on south-east cliffs June 1987 (Fabian).

Lesser Frigatebird (Helekosi) *Fregata ariel*
Tongatapu: Adult female at cliffs near 'Utulau.

White-faced Heron *Ardea novaehollandiae*
Tongatapu: One on mudflats at Sopu west of Nuku'alofa (6 July 1988). Seen clearly and closely for many minutes.

Reef Heron (Motuku) *Egretta sacra*
Tongatapu, Lifuka, Foa: Common around the coast. One at the lake in central Foa. *Lofanga:* One at a small beach.

In July 1988 total sightings for all islands combined were 12 in dark colour phase, 6 in white phase and 4 mottled.

Grey Duck (Tolōa) *Anas superciliosa*
Tongatapu: 30-40 feeding in lagoon and estuarine pools along coast west of Nuku'alofa (6 July 1988). *Foa:* At least 60 at the lake and swamp at the centre of the island.

Niuafo'ou Megapode (Malau) *Megapodius pritchardii*
Niuafo'ou: B1861, skin, male, coll. R.H. Beck, 3 August 1925 (collector's no. 341). B1855, B1857, B1858, 3 eggs, coll. G.W. Quensell, 26 July 1940.

Banded Rail (Veka) *Rallus philippensis*
Tongatapu: Seen intermittently on the main island in plantation areas and once in a Nuku'alofa garden (Fabian). Seen on Fafa I. June-August 1987 (Fabian). *Lifuka:* One running across main road north of Pangai. *Foa:* One at edge of swamp. *Lofanga:* Several seen on foot-tracks and foraging on the main sandy beach, even bathing at the water's edge. They seemed more numerous and more confiding than on the larger islands.

Purple Swamphen (Kalae) *Porphyrio porphyrio*
Tongatapu: One at Sopu west of Nuku'alofa September 1988 (Fabian). Seen on Fafa I. July and August 1987 (Fabian). *Foa:* A few around edge of swamp.

Least Golden Plover (Kiu) *Pluvialis fulva*
Tongatapu: Common around the coast. *Lifuka:* A few around coast, on fields and on the airstrip. *Foa:* A few around coast. One seen at swamp. *Lofanga:* A few on the beaches.

Wandering Tattler (Kiu) *Tringa incana*
Tongatapu: Common around the coast. *Lifuka, Foa:* A few around the coast.

Bristle-thighed Curlew *Numenius tahitiensis*
Tongatapu: 12 on mudflats at Sopu west of Nuku'alofa (6 July 1988). One at same area early September 1988 (Fabian).

Bar-tailed Godwit *Limosa lapponica*
Tongatapu: One on mudflats near Sopu March-April 1987 (Fabian).

Turnstone *Arenaria interpres*
Tongatapu: A few on mudflats at Sopu March 1987 and September 1988 (Fabian). A few in same area July 1988. *Niuatoputapu:* A few on sandbank August 1988 (Fabian).

Crested Tern *Sterna bergii*
Tongatapu: Common along shore west of Nuku'alofa. *Lifuka, Foa:* A few around coast. *Niuatoputapu:* A few around coast August 1988 (Fabian).

Black-naped Tern *Sterna sumatrana*
Tongatapu: One over lagoon near Mu'a August 1987 and approximately 20 off Fafa I. September 1988 (Fabian). *Vava'u:* One on mudflat September 1987 (Fabian).

White Tern ('Ekiaki) *Gygis alba*
Niuatoputapu: Seen over wooded land August 1988 (Fabian).

Domestic Pigeon *Columba livia*
Tongatapu: Common in Nuku'alofa.

Many-coloured Fruit-dove (Manuma'a) *Ptilinopus perousii*
Tongatapu: Seen several times at Mu'a 1987 and 1988 (Fabian). *Lifuka:* Seen twice at Pangai.

Crimson-crowned Fruit-dove (Kulukulu) *Ptilinopus porphyraceus*
Lifuka: Fairly common around Pangai and in plantations. *Foa:* Heard in coastal bush but not seen. *Lofanga:* Common, even around the village. Easier to approach than on Lifuka and Foa. All doves seen closely were this species. *Vava'u:* Several seen around Paradise Hotel July 1987 (Fabian).

Pacific Pigeon (Lupe) *Ducula pacifica*
Niuatoputapu: Seen June and August 1988 (Fabian).

Blue-crowned Lorikeet (Henga) *Vini australis*
Lofanga: Seen occasionally in coconut crowns and flying over the village. In ones and twos; no flocking. *Niuatoputapu:* Several seen near houses August 1988 (Fabian).

White-rumped Swiftlet (Pekepeka) *Collocalia spodiopygia*
Tongatapu: Common and widespread.

Collared Kingfisher (Sikotā) *Halcyon chloris*
Tongatapu: Common and widespread. *Lifuka, Foa, Lofanga:* Present but not common.

Welcome Swallow *Hirundo tahitica*
Lofanga: Single bird seen three times (14 July 1988). *Vava'u:* A few at airport July 1987 (Fabian).

Polynesian Triller (Sikiviu) *Lalage maculosa*
Tongatapu: Common and widespread. *Lifuka, Foa:* Present but not common. *Niuatoputapu:* A few seen August 1988 (Fabian).

Red-vented Bulbul (Manufo'ou) *Pycnonotus cafer*
Tongatapu: Common and widespread.

Polynesian Starling (Misi) *Aplonis tabuensis*
Tongatapu: Apparently not as common as the honeyeater. *Lifuka, Foa, Lofanga:* The commonest land bird. All birds seen closely had dark brown eyes.

European Starling (Ngutuenga) *Sturnus vulgaris*
Tongatapu: Seen occasionally. Flock of about 50 at Fua'amotu Airport (9 July 1988). *Foa:* Two seen together in a coconut crown near Lotofoa (13 July 1988).

Wattled Honeyeater (Fuleheu) *Foulehaio carunculata*
Tongatapu: Common and widespread. *Lifuka:* Fairly common. *Lofanga:* Present, but not greatly abundant.

REPTILES

Stump-toed Gecko *Gehyra mutilata*
Tongatapu: House gecko (H1194). *Lifuka:* House gecko (H1195, H1197, H1198, H1200, H1202) and under corrugated iron in plantation (H1201).

In life, adults had a bright yellowish tinge over the undersides excepting the throat. Juveniles had large pinkish spots along the back and pinkish bands along the tail.

Oceanic Gecko *Gehyra oceanica*
Foa: In timber structure at edge of plantation, with *Lepidodactylus lugubris.* H1203, SVL 83 mm, weight 14.1 g.

Mournful Gecko *Lepidodactylus lugubris*
Lifuka: House gecko (H1196) with *Gehyra mutilata* and in foliage close to dwellings (H1216). *Foa:* In timber structure at edge of plantation (H1204-H1212). *Lofanga:* House gecko (H1215) and in natural sites close to dwellings (H1213, H1214).

Pelagic Gecko *Cyrtodactylus pelagicus*
'Eua: From a cave, coll. D.J. Lowe 12 August 1987 (H1052). *Lifuka:* From rotting log in plantation. H1199, SVL 64 mm, weight 6.6 g.

Snake-eyed Skink *Cryptoblepharus poecilopleurus*
Lofanga: From rocks overgrown with low twiggy shrubs in the supralittoral zone. H1191-H1193, SVLs 33 mm, 35 mm, 36 mm.

Blue-tailed Skink *Emoia cyanura*
Tongatapu: From forest litter (H1177, H1179) and coastal grassland (H1178). *Lifuka:* From plantations (H1180, H1181). *Foa:* From coastal forest litter (H1182-H1184). *Lofanga:* From plantations (H1185-H1190).

Large skink ?*Emoia*
Tongatapu: On 8 July 1988 I saw a large (SVL >80 mm) pale brown skink with a pointed snout and long toes and tail, climbing vertically on a concrete block wall at the Tongan National Centre near Nuku'alofa.
Foa: On 13 July 1988 in forest bordering the swamp at the centre of the island I saw three specimens of a large (SVL >80 mm) arboreal skink with pointed snout and long toes and tail. Two were on vertical tree trunks, the third on a horizontal branch over standing water. I watched them through binoculars but could not catch them. They were pale brown with faint widely spaced darker blotches along the back, pale striping across the lips, and scattered dark spots on the belly.

Banded Sea-snake *Laticauda colubrina*
Tongatapu: H354, Nuku'alofa, pres. E.M. Pomeroy 1939. *Vava'u:* H347, H349, coll. J. Parsons 1877-1880.

Banded Sea-snake *Laticauda laticaudata*
Vava'u: H348, H350, coll. J. Parsons 1877-1880.

"Cook's Tortoise" (Tu'i Malila)
Tongatapu: The Madagascan *Testudo radiata* that was kept in the Royal Palace grounds, that died in May 1966, and that had a carapace 24 cm high (Robb & Turbott 1971) is on display at the Tongan National Centre. Among the historical displays at this centre is an old photograph showing a Tongan man standing astride a tortoise much larger than 24 cm high, suggesting that the 1966 specimen is not the original "Cook's tortoise". On 3 July 1988, while attending a feast in the grounds of the Royal Palace, I saw yet another tortoise — a small (presumably young) one — that had the freedom of the grounds.

Green Turtle (Fonu) *Chelonia mydas*
Lofanga: One specimen ashore that a villager had caught for food.

DISCUSSION

The single White-faced Heron seen on Tongatapu is a new species for the Tongan list. This heron is widespread in Australia, New Zealand and New Caledonia, and there are single records of single birds in Fiji (Clunie *et al.* 1978) and Niue (Child 1982).

The sighting of two European Starlings on Foa, appears to be a new record for the Ha'apai group. Once established this potentially damaging species could quickly spread to neighbouring islands.

The Blue-crowned Lorikeet has died out on many of the inhabited southern Tongan islands during this century (Rinke 1986b), so it was pleasing to find them in quite good numbers on Lofanga. The Whitney South Seas expedition collected this species on six Ha'apai islands (Amadon 1942), but not Lofanga. The most recent report confirms the lorikeet's presence on only three Ha'apai islands: 'Uiha, Tungua and Ha'afeva (Carlson MS 1974 cited by Rinke 1986b).

I was surprised not to see any White-rumped Swiftlets on the Ha'apai islands visited, but apparently they are absent from islands that lack caves (Pratt *et al.* 1987). I particularly looked for trillers on Lofanga — they were not seen or heard. My failure to record honeyeaters on Foa was probably an oversight.

The identity of the large skink on Tongatapu and Foa is a mystery. It is probably a species of *Emoia*, because this genus predominates in the region, and it is probably the same large skink that I saw on 'Eua in 1986 (Gill 1987). I do not know of any records of large *Emoia* from Tonga other than *E. cyanogaster* and *E. nigra* from Vava'u (R.I. Crombie, *pers. comm.*). Descriptions of neither of these seem to fit the animals I saw.

I did not see any Banded Iguanas (Fokai) *Brachylophus fasciatus* despite much searching, especially on Foa and Lofanga. However, several locals described chance encounters with very large green lizards with long tails on Lofanga and its offshore islet Hakauata.

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A REVISION OF THE GENUS MIMOPEUS (TENEBRIONIDAE)

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Abstract. This paper is the first revision of the genus *Mimopeus* (formerly *Cilibe*) to be published since the review by Gebien in his Katalog Tenebrioniden in 1938-42. Because of the considerable length of this manuscript it has been decided to publish it in two parts. This first part contains a description of taxonomic methods and techniques, a description of the genus *Mimopeus*, a key to species of *Mimopeus* and descriptions of nine new species. These are *M. neglectus*, *M. turbotti*, *M. insularis*, *M. parvus*, *M. vallis*, *M. clarkei*, *M. parallelus*, *M. johnsi* and *M. convexus*. The second part of the paper, which is to be published in the next issue of this journal, will include additional information on previously described species and a critical review of previously published data.

This paper is based on a thesis submitted for the degree of MSc in the University of Auckland (Watt 1961). It covers the genus *Mimopeus* (= *Cilibe*). It deals only with adult beetles, but includes a description of the larva of *Mimopeus elongatus*. My occupation with revising the sub-family and tribal classification of Tenebrionidae on a world-wide basis (Watt 1974) has long delayed publication of this work. The original thesis of 1961 is substantially revised here as a result of further experience suggesting to me that the recognition of sub-species categories does not adequately reflect the patterns of geographical variation which exist in nature and thus overloads the literature with unwarranted subspecies names.

All taxa of terrestrial organisms which have been adequately studied in New Zealand vary geographically. *Mimopeus* is no exception to this. The patterns of geographical variation revealed in this study are chiefly of continuous clinal variation and there are no discontinuities where objective boundaries could be drawn between subspecies.

Some taxa recognised by Watt (1961) as subspecies are now treated as full species because the gaps between them and related taxa appear to be constant i.e. they are not bridged by continuous clinal variation. The patterns of geographical variation are frequently complex; perhaps because of this complexity many old names are now regarded as synonyms.

A key to all N.Z. Tenebrionidae is in manuscript form for the *Fauna of New Zealand* series. Because of geographical variation it is usually possible, with careful study, to determine the geographical source of specimens of doubtful geographical origin.

Rec. Auckland Inst. Mus. 25: 95-146 19 December 1988

In the course of this study, type series of all known nominal species of *Mimopeus* have been examined and lectotypes selected and labelled. The type series of *Mimopeus elongatus* Brême was located in the Zoological Museum of the University of Turin (with the assistance of Professor Pietro Passerin d' Entrèves) in a box separate from the main Brême collection which is housed in cabinets. Lectotypes of the remaining species were examined and labelled in the British Museum (Natural History).

Because of the considerable length of this paper which covers additional research on previously described species as well as descriptions of new species of *Mimopeus*, it has been decided to publish the paper in two parts. The first part consists of a description of taxonomic methods and techniques, a description of the genus *Mimopeus*, a key to species of *Mimopeus* and a full description of nine new species. The second part, which it is planned to publish in the next issue of the *Records*, includes additional information on previously described species and a critical review of previously published data. There are thirty species involved, of which sixteen are synonyms. Finally, there is a discussion on the biogeography and ecology of the genus.

Taxonomic Methods

Specific taxonomic characters

Virtually any observable heritable attribute may provide a useful taxonomic character, if its expression differs from one taxon to another. In this revision the external morphology of the exoskeleton and of the external male genitalia of the adult beetles have been used to define the species, together with what data has been available concerning their distribution and ecology. Certain internal characters and the structure of the ovipositor are used in addition in describing the genus. No visible external character has been neglected, but some have been found to be of no use in taxonomic discrimination at the specific level because of their constancy throughout the genus, while others are of little use in discrimination because of considerable individual and geographical variation. The characters which have proved most useful will be found in the keys and diagnoses, while the others are mentioned in the descriptions. In *Mimopeus* there is not a single specific discriminatory character examined which is not subject to geographical variation. This applies as much to the form of the aedeagus (cf. *M. elongatus*) as to most other characters. The aedeagus, however, shows very little individual variation.

Linear dimensions and ratios

These are useful in specific discrimination in some insects. In such cases the adults vary little in size or proportions. It was decided at the beginning of the study of *Mimopeus* to make series of measurements in order to ascertain whether any dimensions or ratios were sufficiently constant within, and sufficiently different between species, to distinguish closely related species and to study and describe individual and geographical variation.

Measurements were made initially with a linear graticule fitted to a stereoscopic binocular microscope calibrated against a graduated slide.

(a) *Dimensions measured and abbreviations.* The following abbreviations and definitions of dimensions apply throughout this paper, in addition to overall length and width.

Pr.L. — middle length of pronotum.
EL.L — middle length of elytra.
Pr.W — greatest width of pronotum.
Ap.W. — width of apex of pronotum (between points of anterior angles).
H.W. — Head width anterior to eyes (between outer margins of canthi).

"Total length" is an unreliable measurement as the head is frequently bent downwards or partly retracted into the prothorax in mounted specimens. Width and pronotal width are not ideal measurements as the relative positions of greatest width may vary from species to species or even between infraspecific populations.

(b) *Abbreviations for statistics.* The following abbreviations apply to statistics calculated from measurements.

Mean — arithmetic mean.
S.D. — standard deviation.
C.V. — coefficient of variability (S.D. expressed as a percentage of the mean).
N — number of specimens measured.

(c) *Comparision of statistics of populations of Mimopeus.* Table 1 compares statistics calculated from linear measurements of samples of six populations of *Mimopeus.* These populations belong to four species of two species groups (*elongatus* group : *elongatus* and *turbotti; opaculus* group : *opaculus* and *insularis*).

Each sample was selected from a series collected at a single locality, thus representing (presumably) members of a single deme. Sampling was random.

Most of the means differ significantly. The *opaculus* group populations are readily distinguished from the *elongatus* group populations by their larger size, the only overlap of ranges occurring in Pr.W. between *M. turbotti* and *M. opaculus.* It is apparent also that the tabulated dimensions are useless for distinguishing *M. elongatus* from *M. turbotti.* The Red Rocks population of *M. opaculus* is distinguishable from *M. insularis* by the larger elytra of the latter, but if other populations of *opaculus* are considered, the ranges overlap. *M. opaculus* is very variable in size depending on its geographical origin: length 13.1-22.8 mm, width 6.8-12.9 mm).

On the basis of the information obtained from the six populations listed in Table 1 it was decided that the dimensions are not sufficiently useful in separating species to justify the enormous amount of time that would have been required to measure every specimen. With a finely graduated millimetre scale it is possible to measure beetles with an error of ± 0.2 mm or less (which is quite adequate for those as large and variable as *Mimopeus*). Most of the dimensions quoted in the specific descriptions were made thus, and are confined to length and width only. Used in addition to other characters these dimensions will assist identification of some species.

In Table 2 the dimensions of males and females of five populations have been separated and statistics calculated for each sex. The Te Hope population belongs to *M. elongatus* (cf. Table 1 for identity of other populations). The dimensions of specimens of four of these populations have been plotted as histograms in Fig.1.

Table 1. Statistics calculated from linear measurements for six populations of *Mimopeus*.

Dimension	Population	Species	Mean mm	S.D.	C.V.	Range mm	N
Pr.L.	Little Barrier I	e.	2.73	0.26	9.6	2.3-3.1	22
	Mt. Mangere	e.	3.14	0.15	4.3	2.9-3.5	20
	Pararaha	e.m.	3.05	0.14	4.6	2.8-3.3	20
	Three Kings Is	tu.	3.62	0.21	5.8	3.2-4.2	24
	Red Rocks	o.s.	4.61	0.25	5.4	4.3-5.3	20
	Poor Knights Is	ta.	5.26	0.19	5.6	4.8-5.6	22
Pr.W.	Little Barrier I	e.	4.94	0.40	8.2	3.9-5.5	22
	Mt. Mangere	e.	5.12	0.31	6.0	4.4-5.7	20
	Pararaha	e.m.	5.02	0.24	4.8	4.6-5.6	20
	Three Kings Is	tu.	6.58	0.52	7.1	5.5-7.3	24
	Red Rocks	o.s.	7.67	0.47	6.1	7.1-9.1	20
	Poor Knights Is	ta.	8.54	0.44	5.2	7.7-9.2	22
H.W.	Little Barrier I	e.	2.31	0.17	7.3	1.9-2.7	22
	Mt. Mangere	e.	2.55	0.14	5.6	2.3-2.9	20
	Pararaha	e.m.	2.48	0.12	4.8	2.2-2.7	20
	Three Kings Is	tu.	3.00	0.19	6.3	2.5-3.3	24
	Red Rocks	o.s.	3.64	0.23	6.2	3.5-4.3	20
	Poor Knights Is	ta.	3.98	0.16	4.0	3.7-4.2	22
EL.L.	Little Barrier I	e.	8.42	0.56	6.6	7.0-9.2	22
	Mt. Mangere	e.	8.50	0.39	4.6	7.8-9.3	20
	Pararaha	e.m.	8.21	0.36	4.4	7.5-9.0	20
	Three Kings Is	tu.	9.47	0.71	7.5	8.3-10.7	24
	Red Rocks	o.s.	12.84	0.60	4.7	11.8-14.4	20
	Poor Knights Is	ta.	16.18	0.74	4.6	14.9-17.4	22

e.*elongatus*, m.*elongatus* West Coast, o.s.*opaculus* Central North I., ta.*insularis*, tu.*turbotti*

From Table 2 and Fig.1 it is apparent that in a single population the means of males differ (often significantly) from the means of females. It is also apparent that the means of dimensions of a single sex differ significantly between populations, due to geographical variation in size in *M. elongatus*. Marked differences from "normal distribution" in Fig.1 are probably attributable to the relatively small samples.

In some cases one sex (usually male) is considerably more variable than the other. This is true of all five dimensions of the Little Barrier Island population, of four dimensions of *M. turbotti*, and of three dimensions of the Mt. Mangere population.

An index of sexual dimorphism in each dimension has been caculated by expressing the difference of the means as a percentage of their sum

$$\text{(i.e. index} = \frac{M_1 - M_2}{M_1 + M_2} \times 100, \text{ where } M_1, M_2 \text{ are the means}$$

of female and male respectively. If the index is negative, M_2 is greater than M_1). These indices for the four *elongatus* populations are listed below.

Little Barrier I.	Pr.L.3.6	Pr.W.4.7	Ap.W.3.8	H.W.4.6	E1.L.4.8
Te Hope	Pr.L.1.0	Pr.W.1.8	Ap.W.1.7	H.W.0.9	E1.L.2.7
Mt.Mangere	Pr.L.-0.3	Pr.W.+1.2	Ap.W.0.6	H.W.0.4	E1.L.1.5
Pararaha	Pr.L.2.3	Pr.W.2.9	Ap.W.0.8	H.W.2.5	E1.L.3.1

The index of sexual dimorphism varies geographically and from one dimension to another of the same population. Also females average larger than males. This is true of most populations of the genus.

(d) *Ratios.* Figure 2 illustrates by means of scatter diagrams, the relationships between two pairs of dimensions for three populations of *M. elongatus* and one of *M. turbotti.* It is apparent that ratios involving the relevant dimensions are not of

Table 2. Statistics calculated from linear measurements for four populations of *Mimopeus elongatus* and one of *M. turbotti.*

	MALES					FEMALES				
Pop.	Mean mm	S.D.	C.V.	Range mm	N	Mean mm	S.D.	C.V.	Range mm	N
			Pr.L.					Pr.L.		
B	2.98	0.24	7.6	2.6-3.4	10	3.20	0.14	4.4	2.9-3.5	10
H	3.37	0.16	4.6	3.1-3.6	10	3.44	0.18	5.2	3.2-3.8	10
M	3.14	0.14	4.3	2.9-3.3	13	3.12	0.17	5.5	2.9-3.5	7
P	2.98	0.14	4.3	2.8-3.2	10	3.12	0.10	3.1	3.0-3.3	10
T	3.46	0.19	5.4	3.2-3.8	10	3.80	0.15	3.7	3.6-3.9	10
			Pr.W.					Pr.W.		
B	4.65	0.35	7.3	4.0-5.2	10	5.11	0.21	4.5	4.9-3.5	10
H	5.37	0.23	4.3	5.0-5.7	10	5.57	0.29	5.1	5.1-6.0	10
M	5.07	0.34	6.8	4.4-5.4	13	5.20	0.21	4.0	5.0-5.6	7
P	4.87	0.17	3.5	4.6-5.2	10	5.16	0.20	3.9	4.9-5.6	10
T	6.10	0.38	6.2	5.5-6.7	10	6.95	0.26	3.7	6.5-7.3	10
			Ap.W.					Ap.W.		
B	2.84	0.23	7.9	2.5-3.2	10	3.17	0.11	3.5	3.0-3.4	10
H	3.23	0.14	4.2	3.1-3.5	10	3.34	0.17	5.2	3.1-3.7	10
M	3.08	0.20	6.3	2.8-3.5	13	3.12	0.14	4.5	2.9-3.3	7
P	2.93	0.12	4.1	2.7-3.1	10	3.08	0.12	3.9	2.9-3.3	10
T	3.50	0.19	5.4	3.2-3.8	10	3.98	0.14	3.5	3.7-4.2	10
			H.W.					H.W.		
B	2.38	0.19	7.9	2.0-2.6	10	2.61	0.10	3.7	2.4-2.8	10
H	2.67	0.12	4.5	2.5-2.9	10	2.72	0.12	4.4	2.6-2.9	10
M	2.54	0.16	6.2	2.3-2.9	13	2.56	0.10	3.8	2.4-2.7	7
P	2.38	0.11	4.4	2.2-2.6	10	2.50	0.10	3.9	2.4-2.7	10
T	2.82	0.17	5.9	2.6-3.1	10	3.13	0.10	3.2	3.0-3.4	10
			E1.L.					E1.L.		
B	7.87	0.52	6.1	7.0-8.6	10	8.66	0.30	3.5	8.2-9.2	10
H	8.69	0.32	3.6	8.1-9.1	10	9.17	0.32	3.4	8.8-9.8	10
M	8.40	0.38	4.5	7.8-9.3	13	8.66	0.34	3.9	8.1-9.2	7
P	7.96	0.27	3.4	7.5-8.3	10	3.45	0.27	3.2	8.2-9.0	10
T	8.82	0.36	4.1	8.3-9.3	10	10.01	0.38	3.9	9.6-10.7	10

B. Little Barrier I, H. Te Hope, M. Mt Mangere, P. Pararaha, T. Three Kings Is *(M. turbotti).*

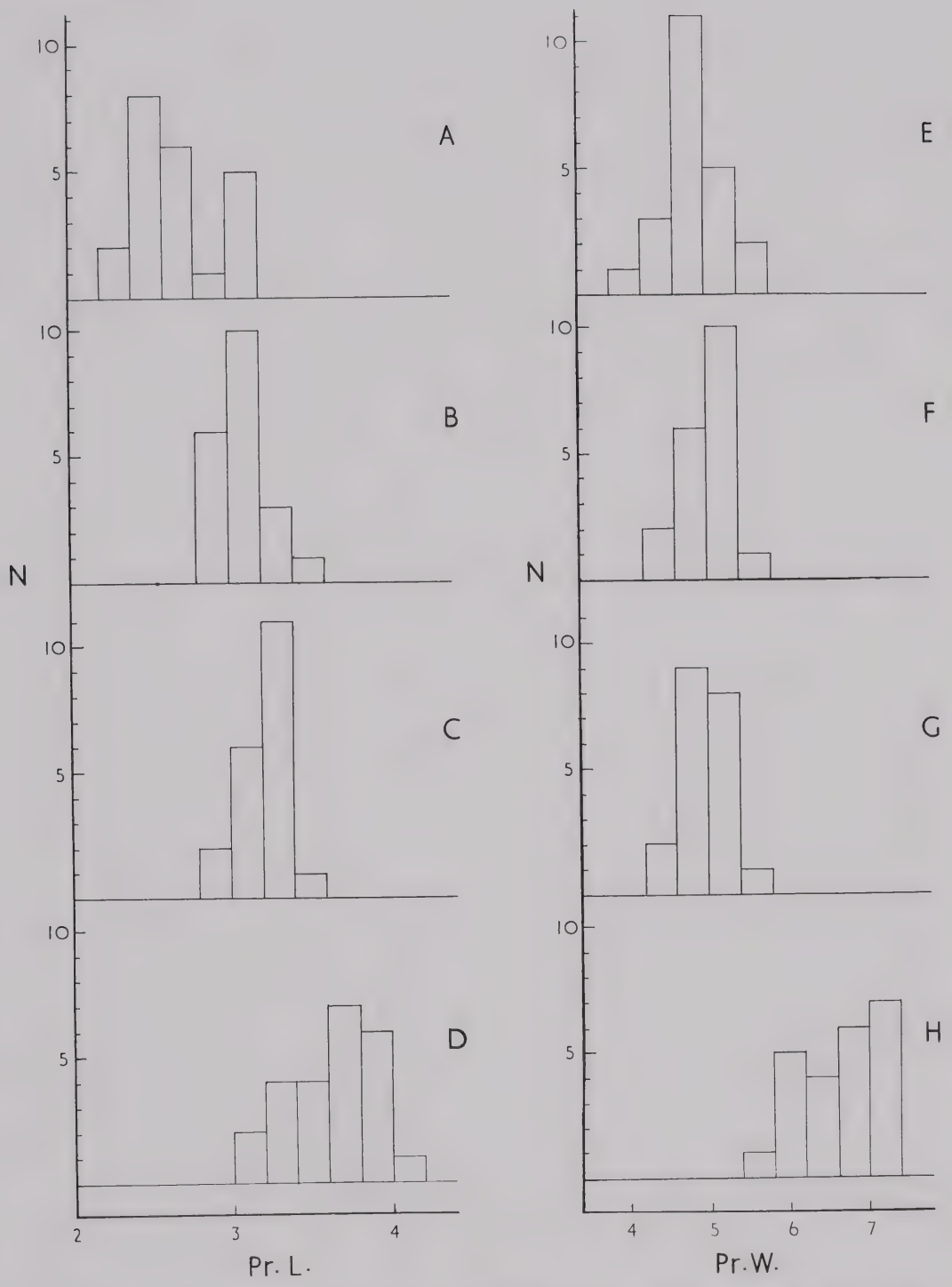


Fig.1. Histograms indicating variation and distribution of certain linear measurements in four populations of the *Mimopeus elongatus* group of species.
N — number of individuals. Pr.L — middle length of pronotum. Pr.W — greater width of pronotum.
A & E — *Mimopeus elongatus* Little Barrier I. B & F — *Mimopeus elongatus* Mt Mangere. C & G — *Mimopeus elongatus* Pararaha Beach. D & H — *Mimopeus turbotti* Three Kings Is.

any use for separating these two species, whether or not the sexes are considered separately. The same applies to other ratios calculated. Ratios express in only a crude way the differences in shape exhibited by various species and infraspecific populations. Such differences are best illustrated by means of accurate drawings or by photographs.

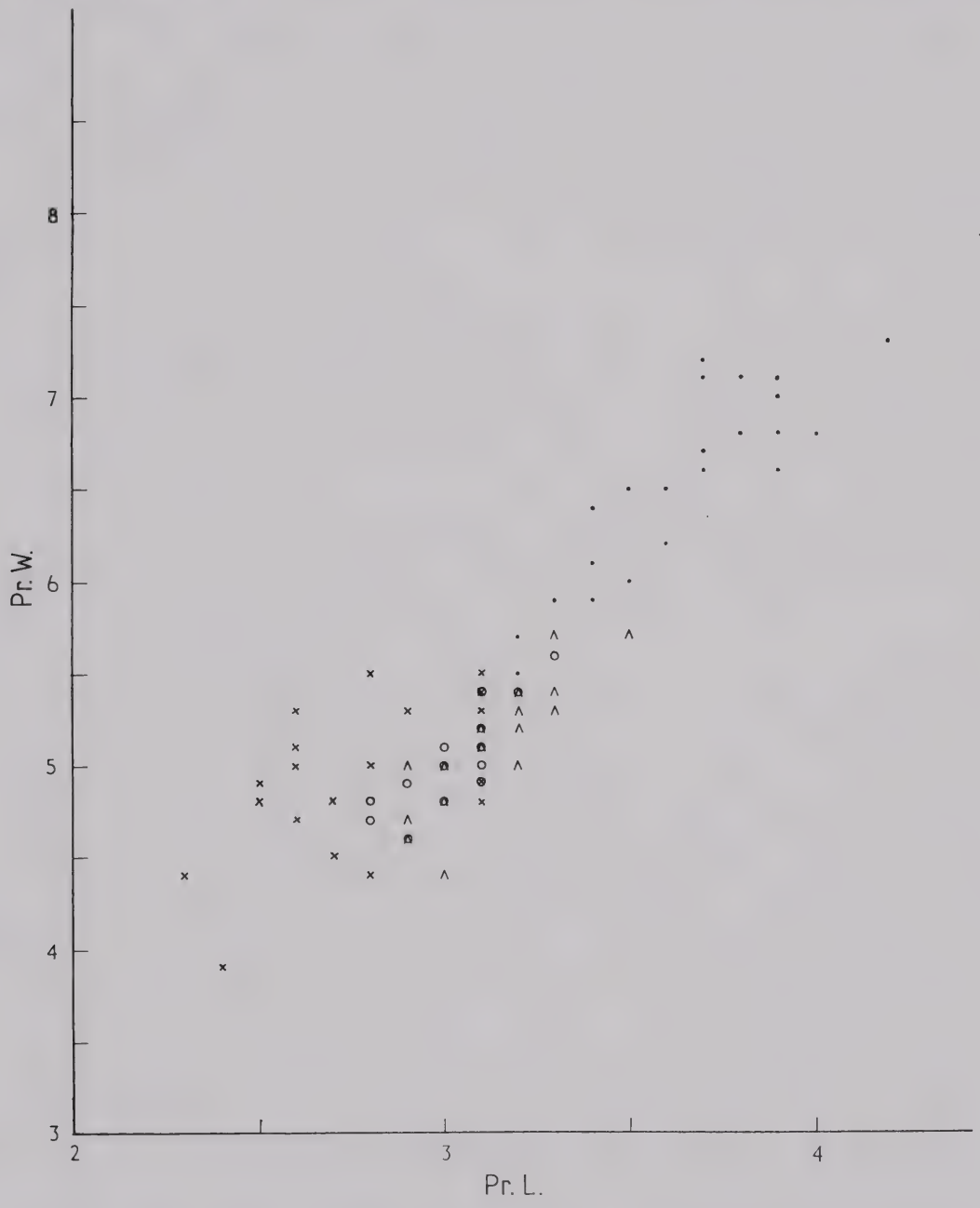


Fig 2. Scatter diagram of pronotal length (Pr.L.) plotted against pronotal width (Pr.W.) for samples of the four populations of the *Mimopeus elongatus* species group listed.

× *M. elongatus* — Little Barrier I.
○ *M. elongatus* — Pararaha Beach.
∧ *M. elongatus* — Mt Mangere.
● *M. turbotti* — *Three Kings Is.*

Individual and geographical variation

The study of dimensions and ratios described above shows (a) that measurable geographical variation occurs in even fairly closely related populations; (b) that considerable individual variation occurs within populations; (c) that all populations show sexual dimorphism (with females usually averaging larger than males); (d) that the degree of sexual dimorphism is geographically variable; (e)that one sex may be more variable individually than the other; (f) that the coefficient of variability varies geographically and (g) that the differences in variability between the sexes vary geographically. These generalisations are applicable to all geographically variable characters, with the qualification that most unmeasurable characters (e.g. punctation and sculpture) show an appreciable sexual dimorphism.

Generic taxonomic characters

The subfamily and tribal classification of Tenebrionidae is based almost exclusively on the external morphology of adults (Watt 1974; Doyen & Lawrence 1979). From a practical point of view, as most adults in collections are dried, structures of the integument are most important. These are mouthparts, tentorium, meso- and metanota and hind wings, abdominal tergites, spiracles, endosternites, especially the metendosternite (cf. Crowson 1938, 1944), the male aedeagus and female genitalia and associated structures.

As much morphological information as possible at the generic level is necessary for providing reliable data on which to base a sound supra-generic classification. This includes the morphology of larvae and pupae.

Techniques

Large beetles should be pinned wth strong stainless steel pins, not gummed by their ventral surfaces to pieces of card. Male genitalia are best extracted from the abdomen of relaxed specimens when they are being mounted. For dissection of female genitalia including delicate internal structures see Doyen & Lawrence (1979). Genitalia are removed from dried specimens by breaking off the abdomen and then soaking it in Barber's beetle relaxing fluid or hot water (Beirne 1962) until the tissues are soft, or by soaking the whole insect in the fluid. On removal, the aedeagus is cleaned and mounted slightly on its side on a strip of card, which is then placed on the pin underneath the beetle; or in glycerine in a microvial. Female genitalia should be kept in glycerine, as they cannot be examined satisfactorily if dry. If the abdomen has been removed, it should be glued back on the specimen from which it came.

For examination of internal structures it is necessary to treat the whole specimen with KOH solution. Treated specimens can be examined, drawn and kept in glycerine. It will probably be found desirable to make slide mounts in Canada balsam of small structures, such as mouthparts.

It is very useful to have some specimens of each series properly fixed and preserved in 70% alcohol + 5% glycerine, together with larvae and pupae if these were collected at the same time. Properly preserved specimens are more useful than dried material.

All drawings in this revision were made using a squared eyepiece graticule and squared paper. Most were made from dried specimens, but those of mouthparts, metendosternites, etc., were made from slide mounts and glycerine preparations following treatment with KOH.

Material Examined

Over 3,200 adults of *Mimopeus* have been examined and identified. In a number of cases it has been necessary to select lectotypes from series of syntypes. To the best of the writer's knowledge, all major collections of *Mimopeus* have been examined. A list of institutions where material is held is given below.

For details of the usage of the names *Cilibe* and *Mimopeus* see Watt (1968). In summary, many species which were originally placed under the generic name *Cilibe* now must be placed under the senior synonym *Mimopeus*.

Collections and Collectors

To keep this paper as short as possible the names of collectors have been omitted from the list of material examined. Full data are recorded on cards at Mt Albert Research Centre, Entomology Division, DSIR. Most of the specimens on which this revision is based were collected by me, and at the same time notes on ecology and bio-geography were made. In many instances immature specimens were collected in association with adults. These were all carefully labelled with the association and are available (at NZAC) for further study.

Other collectors who contributed valuable material to this revision are as follows (listed by institution where most of material is housed).

Entomology Division, D.S.I.R., Auckland, Arthropod Collection (NZAC). E.S. Gourlay, B.B. Given, G.W. Ramsay, J.S. Timlin, J.I. Townsend, J.S. Watt, J.M. Hoy, R.J. Tillyard, A.E. Brookes (including T. Broun Collection), W.P. Thomas, B.M. May, R.A. Cumber, A. Tonnoir, G. Kuschel, L. Marchant, J.D. Fawcett, A. Philpott, A. Richardson, C. Fairburn, R.W. Taylor.

Auckland Institute and Museum (AMNZ). Through generous donations the Auckland Museum has one of the most complete collections of *Mimopeus*. P.M. Johns, J.C. Watt (part of collection given to NZAC). C.E. Clarke (part of collection bought jointly by AMNZ and BMNH), E.G. Turbott, K.A.J. Wise.

British Museum (Natural History), London, England (BMNH). T. Broun, (including T. Hall, W.W. Smith, G.V. Hudson, F.W. Hutton, J.A. Urquhart, A.E. Brookes, F. Buchanan), H. Swale, C.E. Clarke (collection divided with AMNZ), C. Darwin, F. Bates (who had an important collection of N.Z. Tenebrionidae but there is no record that he himself visited New Zealand; he may have acquired the collection by purchase).

Forest Research Institute, Rotorua (FRNZ). J.S. Dugdale, R. Zondag, R. Milligan, R.J. Mac, J. Rawlings, J. Cox, J. McBurney.

National Museum of New Zealand, Wellington (NMNZ), R.R. Forster, B.A. Holloway, G.W. Ramsay, G.V. Hudson, A. Harris, N. Hornibrook, H. Wellman, C.A. Fleming, A. Castle, J.T. Salmon, R.A. Falla, R.A. Ordish.

Canterbury Museum, Christchurch (CMNZ). F.W. Hutton, P.M. Johns, R. Pilgrim.

The Genus *Mimopeus*

Tribal placement of Mimopeus

Mimopeus under the name *Cilibe* was included under the predominantly Australian tribe Helaeini. However, Gebien (1938-42) in his Katalog Tenebrioniden listed it in the predominantly Australian tribe Nyctozoilini without giving any reasons. However, I believe the placement in Helaeini is correct. This opinion is based on a superficial examination of the Australian genera *Helaeus*, *Pterohelaeus*, and *Saragus* and associated larvae, but it remains to be checked. *Mimopeus* differs from these Australian genera in lacking hind wings (*Pterohelaeus* is fully winged). It differs from *Helaeus* as the sides of the pronotum and the elytra are not thinly explanate.

The tendency to develop foliate lateral expansions of pronotum and elytra is not uncommon in Tenebrionidae, and has apparently evolved independantly a number of times in widely separated tribes; e.g. Eurychorini (*Eurychora* etc.), Eleodini (*Embaphion*); Helaeini, Cossyphini. Foliate expansions are not present on the elytra of all species of *Mimopeus*, being entirely absent in *M. rugosus*, *M. convexus*, *M. tibialis* and *M. impressifrons*, and poorly developed in other species.

Gebien (1938-42), for unspecified reasons, placed the New Zealand genus *Mitua* (=*Pseudopatrum*) next to *Mimopeus* in his catalogue. *Mitua* is quite unlike either Nyctozoilini or Helaeini in adult structure, especially of aedeagus and ovipositor. Its larval structure (Hudson 1934 : 86 and Plate 9, fig.3a) is not at all like that of *Mimopeus*. *Mitua* belongs in Adeliini.

Of New Zealand Tenebrionidae, *Mimopeus* is much more likely to be confused at first sight with *Pheloneis* (Adeliini) rather than with *Mitua*. In *Pheloneis* the clypeus is very small, there are distinct striae formed by rows of punctures in the elytra, the intercoxal processes are quite unlike those of *Mimopeus*, intercoxal processes and abdominal sternites lack submarginal grooves, and the mentum is more convex and has more strongly rounded sides. There are other less obvious differences, which reflect the comparatively remote relationship of the tribes Helaeini and Adeliini.

Changes in specific nomenclature

In this study it has been found necessary for a variety of reasons to place certain specific names in synonymy. The main cause of this synonymy is the failure of earlier workers to appreciate the degree of geographical variation in species.

This is hardly surprising considering the limited material with which they had to work.

T. Broun was the only author with first-hand knowledge of the beetles in the field. Of the 26 nominal species listed by Gebien (1938-42), only 12 are recognised in the present revision. In addition nine new species are described. Most of the synonymy was published by Watt (1968) and is updated in the description of species later in this paper.

Species to be excluded

"Cilibe" asidaeformis Fauvel (Fauvel 1904 : 187-8) from Ile des Pins, New Caledonia, was placed by its describer in *Cilibe*, which from 1859 (Lacordaire 1859) until then had been regarded as a strictly New Zealand genus.

It was transferred by Kaszab (1982) to the Adeliini genus *Pseudocilibi* endemic to New Caledonia.

Genus **Mimopeus** Pascoe, 1866

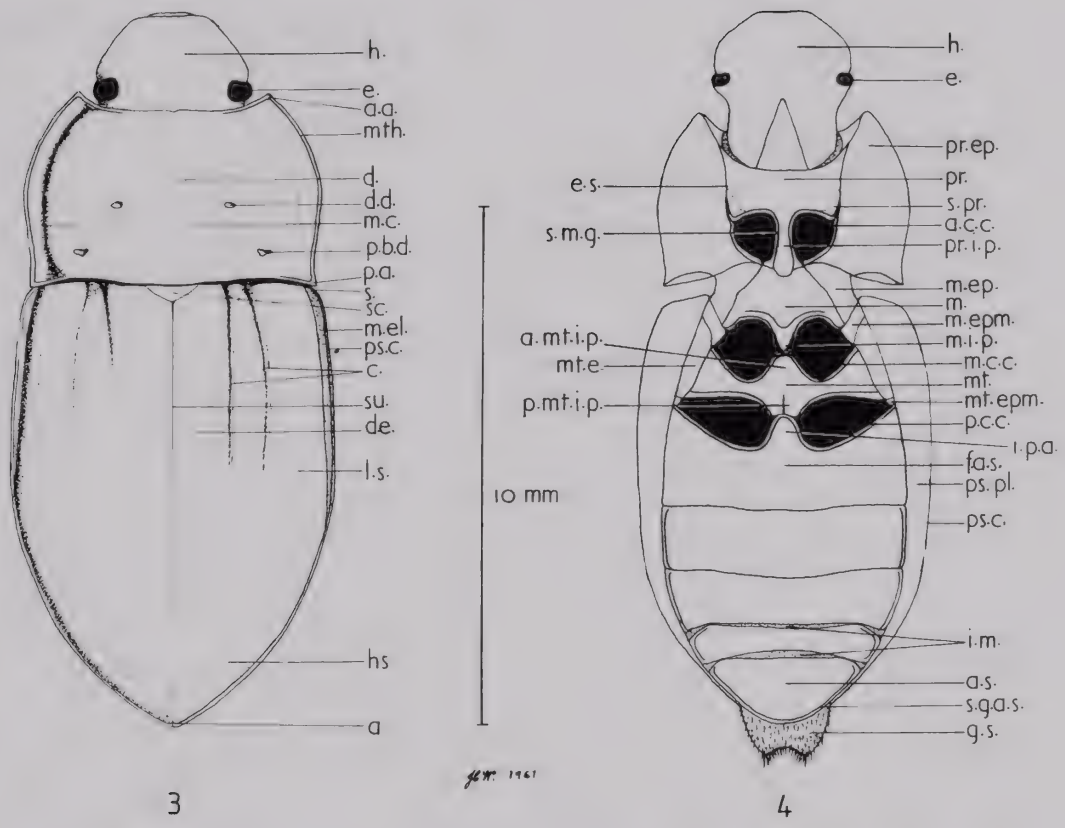
Pascoe, 1866, Journ. Ent. 1: 368.

Type species. *Mimopeus elongatus* (=*Cilibe elongata* Brême, 1842).

Moderately elongate scarcely depressed. Sides of elytra scarcely or not explanate. Prosternal intercoxal process only slightly convex. Surface almost smooth with very short, very fine microscopic setae. Anterior intercoxal process of abdomen narrowly triangular. Last abdominal sternite with a fine marginal groove underside finely and sparsely punctured. (Figs.3,4).

Antennae. Approximately as in Fig.7. Segements 2-7 almost circular in cross-section, remainder dorso-ventrally flattened. Each of the basal segments bears a ring of comparatively stout setae near its apex, but these become progressively finer and shorter after segment 7. There are finer and shorter setae over the remainder of the surface. Ratio of length of segments 2 : 3 : 4 : 5 approxiately 1 : 2.3 : 1.6 : 1.3 (*M. elongatus*, KOH preparation — varies slightly from this in other species). The setae arise from small punctures. Microsculpture visible at 25 × magnification is visible on terminal segment (11), and usually on segments 8-10.

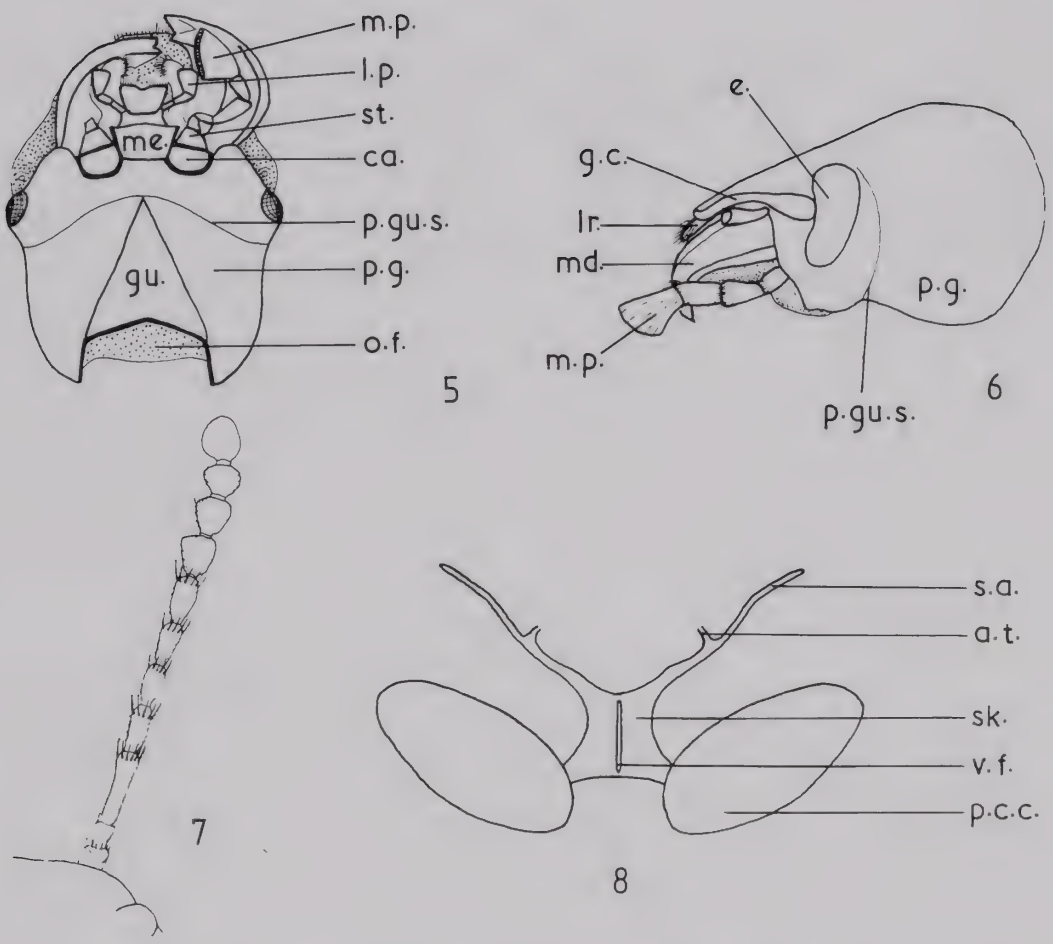
Dorsal surface of head. Clypeus emarginate anteriorly, clypeal sutures faint; edge of genal canthus rounded, extending about as far laterally as eyes. Eyes reniform, embracing genal canthus, upper lobe more extensive than lower lobe (Fig.6), facets large, each clearly visible at 10 × magnification. Punctation of surface variable, but always with macropunctures, on interstices between which are considerably smaller micropunctures; interstices flat or convex, uneven in closely punctate species, microsculpture weak to strong.



Figs. 3, 4. *Mimopeus elongatus.* Details of whole insect, male. 3. Dorsal. 4. Ventral.

h.head, e.eye, a.a. anterior angle, mth.mesothorax, d.disc, d.d. discal depression, m.c. marginal channel, p.b.d. prebasal depression, p.a. posterior angle, s. shoulder of elytron, sc. scutellum, m. el. margin of elytron, ps.c. epipleural carina, c. costa, su. suture (between elytra), d.e. disc of elytron, l.s. lateral slope of elytron, hs. hind slope of elytron, a.apex, pr.ep. proepisternum (frequently termed prosternal hyposternum), pr. prosternum, e.s. episternal suture, a.c.c. anterior coxal cavity, pr.i.p. prosternal intercoxal process, s.m.g. submarginal groove, m.ep. mesepisternum, m. mesosternum, m. epm. mesepimeron, m.i.p. mesosternal intercoxal process (anterior process), a.mt.ip anterior metasternal intercoxal process, mt.e.metepisternum, p.mt.i.p. posterior metasternal intercoxal process, m.c.c middle coxal cavity, mt. metasternum, mt.epm. metepimeron, p.c.c. posterior coxal cavity, i.p.a. intercoxal process of abdomen, f.a.s. first abdominal sternite, ps. pl. epipleuron, ps.c. epipleural carina, i.m. intersegmental membranes between abdominal sternites, a.s. abdominal sternite (last movable sternite), s.g.a.s. terminal ventrite, g.s. genital sternite.

Pronotum. Considerable variation in shape exhibited, both within and between species. Almost flat to convex. Always transverse. Emarginate anteriorly, with distinct but often blunt anterior and posterior angles, width always greater between posterior than anterior angles, sides generally with distinct marginal thickening. Marginal channels generally present sometimes obsolete, sometimes with broad upturned flanges outside them. Depressions usually present on either side near base, often in middle near base, and sometimes on disc; apparently without



Figs. 5-8. *Mimopeus* spp. Details of head and thorax. 5. *M. elongatus.* Ventral view of head, right maxillary palp removed. 6. *M. elongatus.* Lateral view of head. 7. *M. elongatus.* Dorsal view of antenna. 8.*M. opaculus.* Dorsal view of KOH-treated preparation of metendosternite, tilted down slightly from left to right. m.p. maxillary palp, l.p. labial palp, st. stipes, ca. cardo, p.gu.s. pregular sulcis, p.g. postgena, o.f. occipital foramen, me. mentum, gu. gula. e. eye, g.c. genal canthus, lr. labrum, md. mandible, s.a. arm, a.t. anterior tendon, sk. stalk, v.f. ventral flange, p.c.c. posterior costal cavity.

taxonomic significance. Punctation very variable, but always with macro- and micropunctures, although in some populations some of the latter are replaced by small granules. In some cases macropunctures bear short, small, recumbent setae, just visible at 25 × magnification.

Elytra. Fused along suture (hind wings vestigial). Epipleural carina always present, generally with a distinct submarginal channel inside it, at least near base. Suture often slightly raised. Three primary costae corresponding in position to main longitudinal tracheae often visible as indistinct elevations, sometimes quite distinct.

Sometimes with indistinct secondary costae between primary costae. There is no trace of striae. Punctation of upper surface irregular, of same type as pronotum, but punctures smaller or larger than those of pronotum, depending on the species. Macropunctures usually bearing short, fine hairs visible at 100 × magnification, sometimes at 25 × magnification. Microscopic granules often present on hind slopes and lateral slopes, sometimes on disc. Microsculpture weak to strong. Epipleura relatively broad, deflexed at roughly 45°C, punctation always unlike that of upper surface, punctures usually much smaller, granules sometimes present.

Mesonotum. Scutum well sclerotised, crescent-shaped, very transverse about five times wider than long. Median longitudinal impression and posterior suture (between scutum and scutellum) distinctly impressed. Dorsal surface closely punctured, each puncture bearing a fine, short seta. Transverse struts present ventrally. Prescutum (if present) completely membranous and indistinguishable. Scutellum broadly shield-shaped, distinctly raised posteriorly above level of scutum — this raised portion is approximately triangular, and is the visible part described in specific descriptions. Axillary cord extending slightly further laterally than scutum.

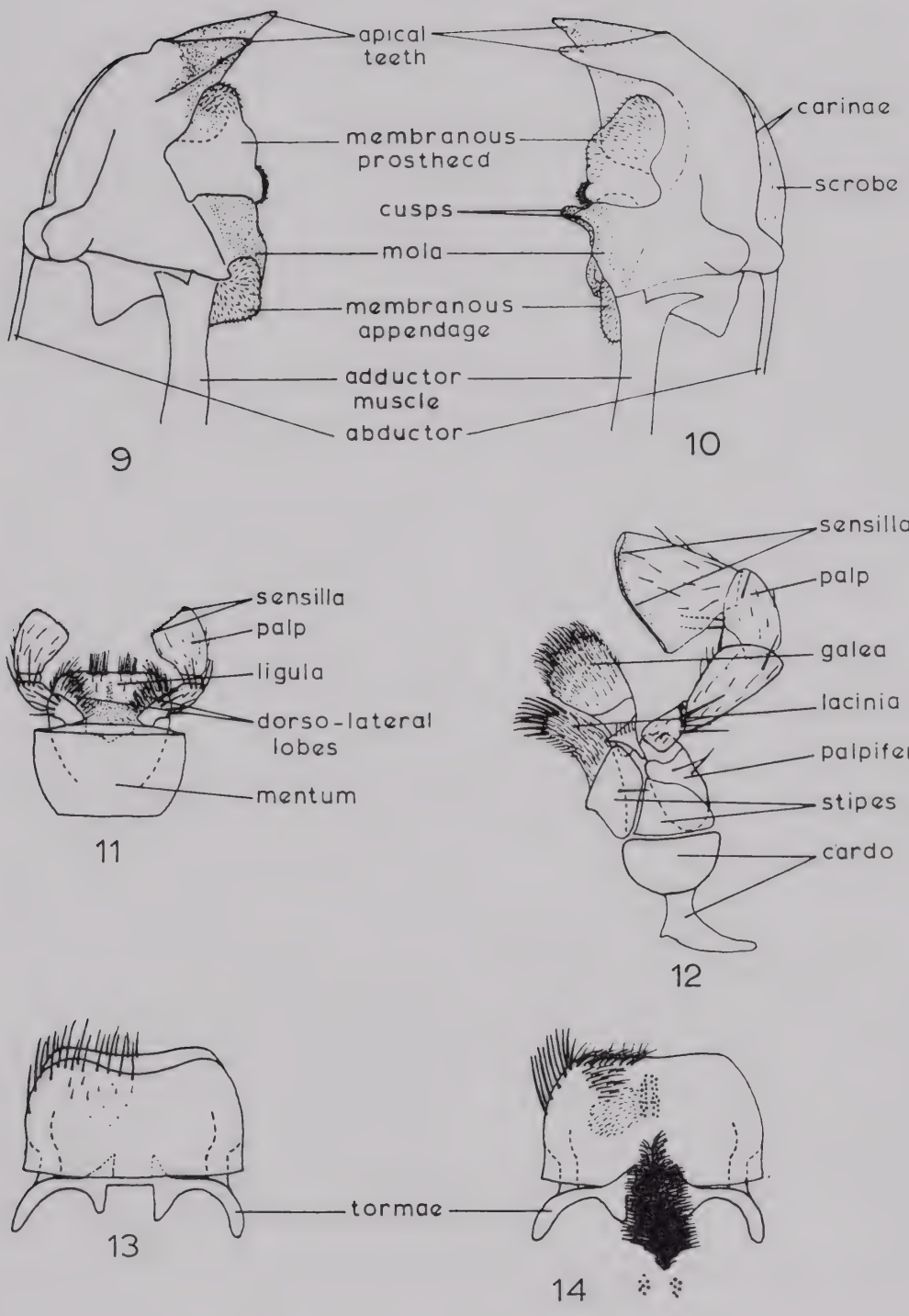
Metanotum. Wings functionless, vestigial, not exceeding about 4 mm in length. The bases of 2 veins only (presumably R and Cu) are distinguishable. A study of the wing venation of the fully winged *Pterohelaeus* might be of assistance in interpreting the vestigial venation of *Mimopeus.*

Metanotum shows considerable reduction compared with that of fully winged tenebrionids, as is general in flightless forms. Very short and transverse, over five times wider than long. Scutellum broadens considerably anteriorly. All sclerotised bars, struts etc. reduced or absent except for those between scutum and scutellum, which are greatly extended laterally.

Abdominal tergites and pleurites. All pleurites membranous. All tergites membranous except tergite 7, tergite 8, and in the male, tergite 9 (=proctiger of ovipositor in female). Tergite 7 is roughly the same shape in both male and female. The apex of tergite 8 is rounded in the female, but subtruncate in the male. Tergites 7 and 8 are covered densely with fine setae in both male and female.

Mouthparts (Figs.9-14). Labrum approximately as in Fig.13, truncate or emarginate anteriorly, dorsal surface bearing setiferous punctures near anterior margin, anterior setae moderately stout, others short and fine, all projecting forwards. Surface covered with very fine, irregular microsculpture. Epipharyngeal surface (Fig.14) densely setose anteriorly, these setae stout and directed towards mid-line, except those on anterior margin which extend straight forward. Setae absent from latero-posterior and posterior surfaces. Median area bears large punctures, on each side of which is an area of minute denticles directed towards it. Tormae as in Figs.13 and 14, and joined by transverse bar, not extensively fused with epipharynx.

Mandibles (Figs.9, 10) stout, asymmetrical. Scissorial and molar parts heavily sclerotised, black even in cleared KOH preparations. Outer dorso-lateral and ventrolateral edges sharply carinate. Scrobe between carinae bearing a few very fine and short setae. Apices of both mandibles bifid. Scissorial edge of right



Figs. 9-14. *Mimopeus elongatus*. Adult mouthparts. 9. Right mandible. Ventral view. 10. Left Mandible. Ventral view. 11. Labium, ligula partly retracted. Ventral view. 12. Left maxilla. Ventral view. 13. Labrum. Dorsal view (setae of right half omitted). 14. Epipharynx. Ventral view (setae of left half omitted).

mandible with a strong indentation, that of left slightly sinuate, scythe-shaped. Each mandible bears a membranous prostheca between scissorial and molar parts, that of right mandible rather larger than that of left. Prosthecae fill very deep indentations between scissorial and molar parts, that of the right mandible being larger. Molar surface of right mandible fairly regular, that of left irregular, with two prominent cusps at its distal edge, joined by a slightly lower transverse ridge. Proximal part of mola bearing a membranous, densely setose appendage.

Maxillae (Fig.12), symmetrical. Cardo, stipes (which is composed of two sclerites showing no signs of fusion, as in most tenebrionids) and palpifer finely, sparsely and irregularly punctate, each puncture bearing a very fine, short seta. The position and presence of the large stout setae appear to be fairly constant. Terminal segment of palp securiform.

Labium (Fig.13) with prementum somewhat retracted under mentum. Mentum bearing fine, rather sparse punctures, those of lateral depressions bear moderately long, stout setae, while those elsewhere bear very fine short setae. Basal and second segments of palpi each bear a ring of relatively long, stout setae near their apices, all segments bear smaller setae elsewhere. Apical margin of terminal segment bearing numerous small papilla-like sensilla. Ligula trilobed, densely setose on the areas shown in Fig.11 (the lateral lobes are dorsal in position, and their setae arise on the dorsal surface of the ligula). Submentum not distinguishable, fused with postgenae.

Ventral surface of head (Fig.5). There is disagreement concerning the terminology of 'sclerites' (topographical areas) of the head. Imms (1957) names the lateral and ventral regions of the head in Coleoptera (excepting the gula) the genae, and many coleopterists use the term in this sense. Snodgrass (1935, fig.67) refers to the ventral areas from the base of the maxillae backwards (excluding gula) as postgenae. This is also the nomenclature used by Koch (1955). In this revision the term postgena is used in the sense of Snodgrass and Koch to describe the ventrolateral surface behind the maxillae and lateral to the gula. The genae constitute the genal canthus, and the areas directly in front of, below and behind the eye (Fig.6).

Head shallowly constricted behind eyes and just in front of gula (Fig.5). Pregular region of postgenae distinctly emarginate at base of cardo, edge of emargination forming a distinct, usually rounded, marginal ridge, outer angle of maxillary emargination obtusely raised or (in *M. tibialis*) dentate. Pregular region usually moderately deeply and closely punctured, with micropunctures between macropunctures. Gular region of postgenae usually more finely punctured, with punctures in irregular transverse grooves. All the macropunctures bear fine setae, usually visible at 25 x magnification. Gula triangular, surface generally impunctate and shining, frequently with irregular transverse or longitudinal grooves or wrinkles.

Endoskeleton of head. Not studied in detail.

Ventral surface of prothorax (Fig.4). Prosternum as in Fig.4, generally finely punctate and shining, sometimes granulate, often more or less laterally rugose. Intercoxal process with distinct submarginal grooves, posterior projection bulbous, more or less prominent. 'Proepisternum' as in Fig.4 (pr.ep.), actually represents

the proepisternum and the deflexed part of the pronotum, which are completely fused together. Proepisternum finely punctate, each puncture bearing a short seta, interstices sometimes bearing small granules.

Ventral surface of mesothorax (Fig.4). Mesosternum considerably depressed anteriorly, depressed part bearing a median longitudinal ridge and more or less setose. Intercoxal process (Fig.30 more detailed than in Fig.4) moderately broad, finely punctate, with distinct submarginal grooves. Mesepisternum with similar sculpture and clothing to depressed part of mesosternum. Mesepimeron (m.epm.) closing mesocoxal cavity outwardly by its inner edge, smooth and finely punctate. Trochantins of mesocoxae exposed (Fig.73).

Ventral surface of metathorax (Fig.4). Metasternum short, about three times wider than long, intercoxal processes as in Fig.4, submarginal grooves near anterior and posterior edges. Median longitudinal suture extends about two fifths distance from posterior edge towards anterior edge. Finely punctate, lateral punctures bearing fairly long yellow setae, surface generally smooth with a few transverse and longitudinal wrinkles, sometimes with small granules. Mesepisternum and metepimeron smooth, shining, finely punctate, with short yellow setae.

Metendosternite (Watt 1974: 443,fig 43). This structure has been little considered in the systematics of Tenebrionidae. Crowson (1938, 1944) illustrates 5 species, all of which, however, appear to be either particularly primitive (*Tribolium*) or specialised. A fairly generalised type is that of *Tenebrio molitor* (Watt 1974, fig.43), which is used here as a basis for comparison.

Mimopeus opaculus and *M. elongatus* have been examined for the structure of their endoskeleton, and their metendosternites are as illustrated in Fig.8. In these, a stalk of moderate length is present. Arms fairly long, quite slender. Anterior tendons arise about half way between base and apex of arms. Ventral process of arms reduced, no "lamina" present. The same strengthening ridges of the arms are present as in *Tenebrio*, and the main differences are in the position of origin of the anterior tendons, in the relative proportions of the arms and stalk, and in the more greatly reduced ventral process of arm in *Mimopeus*. Note that in *Tenebrio* the anterior ridge joins the ventral flange at its apex, but in *Mimopeus* the junction is behind the apex.

The slight differences between the metendosternites of *M. elongatus* and *M. opaculus* may be due mainly to the difference in size of the beetles, or they may have some significance in intrageneric systematics.

Abdominal sternites (Fig.4.) Sternites 3-7 (i.e. first 5 visible sternites) heavily sclerotised. Intercoxal process of sternite 3 fairly broad and rounded anteriorly. Submarginal grooves present parallel to anterior margin of sternite 3 and near lateral margins of sternites 4 and 5, and usually of sternites 6 and 7. Each of these sternites bears macropunctures, fine setae and micropunctures. Intersegmental membranes visible between sternites 5 and 6 and between 6 and 7. Sternite 8 slightly sclerotised. In males apex emarginate. In females apex coming to a single, fairly blunt point. Ventral surface of sternite 8 in both sexes covered with fine setae, these are especially long on the apices in the male.

Aedeagus (Figs 15, 25-29,33-41,67,69,79-82,84,93,94,95,99,103,104). Koch (1955) has made the most extensive study of aedeagus in Tenebrionidae, and his morphological nomenclature has been followed in this study (Fig.15). The following terms are equivalents (cf. also Sharp & Muir 1912).
Apicale = apical piece of tegmen (i.e. fused parameres).
Basale = basal piece of tegmen.
Penis = median lobe of aedeagus.

In *Mimopeus* the aedeagus is not inverted as in many tenebrionids. When retracted into the abdomen the tegmen lies above the median lobe, and when extended the whole structure curves around beneath the abdomen, so that the tegmen lies beneath the median lobe (Fig.70.). In the shape and proportions of the aedeagus (see figures) there is considerable variation between and even within species (Figs.25-28), but all show the same basic structure.

On apicale, parameres barely separated at apex, sometimes fused almost to apex. Dorsal and lateral surfaces of apicale bear scattered fine sensory setae and sensilla. Inflected alae extend ventrally towards base for over half the length of basale and form, with the inflected alae of the latter, a fairly complete tube around the penis.

Sides of basale strengthened by fairly heavily sclerotised supports. Inflected alae extending entire length of basale, most extensive at about mid-length. There is an internal U-shaped slender ridge just distal to the basal margin, presumably providing attachmement for a muscle.

Penis simple, without lacinia. Base supported by lateral sclerotised pieces; dorsal surface membranous at the base, becomes sclerotised anteriorly, while sclerotised alae become inflected onto the ventral surface. Inner groove runs along

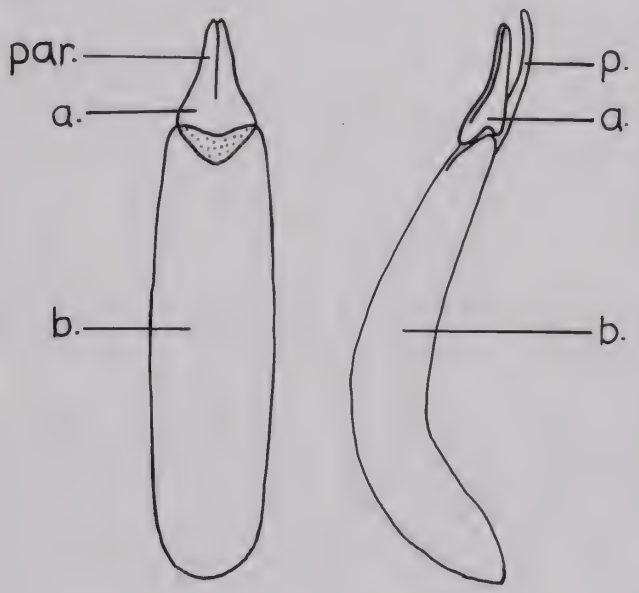


Fig.15. *Mimopeus opaculus*. Aedeagus. Left. Dorsal. Right. Lateral.
a. apicale, b. basale, par. paramere, p.penis.

the underside of the dorsal surface to apex. Upper and lower surfaces bear scattered microscopic sensilla (visible in cleared preparations under compound microscope at 100 × magnification).

Ovipositor. The ovipositors are not considered in detail at the specific level, in the present revision, but at the end of this description there is an indication of the characters subject to interspecific variation.

The female reproductive organs of Tenebrionidae have been neglected by systematists. It has been found necessary to establish a simple and accurate terminology to replace that of Tanner (1927) which is inaccurately applied, that of Blaisdell (1909) which is not generally accepted, and that of Lindroth & Palmen (1970), which is over-simplified (see Watt 1974).

The ovipositor of *Mimopeus* is a moderately elongate tube-like structure. The membranous base arises between tergite 8 and sternite 8, which in turn lie between tergite 7 and sternite 7. Tergite 7 and sternite 8 bear pubescence composed of fairly fine hairs, and the edge of tergite 8 bears a fringe of fine hairs. Sternite 8 is bluntly pointed apically. Its anterior edge bears a Y-shaped anterior extension, the spiculum gastrale. The intersegmental membrane arising between tergite 8 and sternite 8 comprises almost half the length of the extruded ovipositor. At its distal end arise 3 plates, a dorsal proctiger and two lateral paraprocts. The distal end of the proctiger bears a fringe of setae. Each paraproct is strengthened by a rod (baculum) running parallel to its ventral border. Arising between the paraprocts are a pair of fairly heavily sclerotised coxites each bearing a small stylus in a small hollow on its dorso-lateral surface near its apex. Each stylus bears two fine setae. Setiferous punctures are present in a longitudinal hollow on the dorso-lateral surface of each coxite, and a few fine setae are present on lateral and ventral surfaces. Ventrally each coxite bears two transverse shallow sulci, neither of which extends onto the dorsal surface. Apparently the ventral part of the base of each coxite represents the valvifer (Mr R.A. Crowson, *pers.comm.*), but the division is not at all obvious in *Mimopeus*, although clearly visible in some other Tenebrionidae (*Uloma*). Beneath the proctiger and lying above the bases of the coxites is the anal membrane containing the anus. The walls of the rectum are sclerotised and thickened longitudinally, and are visible in cleared preparations. The vulva opens between the apices of the coxites.

A few setiferous punctures at present near the apices of the paraprocts. The chaetotaxy is not described in detail as the positions and number of setiferous punctures of one side differ from those of the other side of the same specimen.

The ovipositor of *M. opaculus* is very similar to that of *M. elongatus*, differing mainly in the proportions of the coxites (which are relatively stouter) and of the proctiger (which is more sharply acuminate). Other species differ in these characters and in size of styli, length and stoutness of setae, and relative dimensions of other sclerites. The position of the ventral sulci of the coxites varies. They are closer together in *M. rugosus* and *M. convexus* than in other species.

Comparison of characters. Some of the above-described morphological characters are compared for all species and various populations in Table 3.

Dimensions (cf. also Table 4). Length: 8.2-25.3 mm.
Width (of elytra): 4.2-12.8 mm.

Distribution. Confined to New Zealand.

Table 3: Comparison of morphological characters in species of *Mimopeus*.

CHARACTER NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
elongatus Northland	s	x	x	m	s	x				x	x					x			x			
elongatus West Coast		x	x			x				x	x					x			x			
elongatus Cook Strait		x	x		s	x				x	x					x			x			
neglectus		x	x	x		x				x	x					x			x			
elongatus Otago-Southland		x				x				x	x					x			x			
turbotti	x	x	x	x	x	x				x	x					x						
pascoei			x		x	x				x	x					x						
subcostatus		x	x		x	x				x					x		x			x		
humeralis		x	x	x	x	x			x			x	x			x				x		
thoracicus		x	x	x	x	x			x			m	x			m	f			x		
vallis		x	x	x	x	x			x							x			x			
parvus			x	x	x	x			x							x			x			
parallelus			x	x	x				x			x	x		x	x				x		
buchanani		x	x	x	x	x			x								x				x	
lateralis	x	x	x	x	x	x			x								x			x	x	
opaculus Central North I and South I	f	x	s	x	f	f		x			x						x				x	
opaculus Banks Pen.		x	x	x				x			x						x					
opaculus Cook Strait			x	x				x			x						x					
opaculus Cuvier I	x	x	x	x	x	x		x			x						x				x	
opaculus Waiheke I (?)		x	x	x				x			x						x					
opaculus Inland Southland					x	x		x			x					x						
insularis					x	x		x			x						x				x	
impressifrons Central Otago			f			x		x			x					x			x			
lewisianus						x		x									x		x			
costellus		x	x	x	x	x		x				x	x		x			x		x	x	
clarkei		x	x	x		x		x				x			x		x			x	x	
granulosus		x	x	x	x	x			x			x	x		x			x		x	x	
tibialis						x				x		x		x			x		x			x
convexus						x	x					x		x	x		x		x		x	
rugosus					x	x	x					x		x	x			x	x		x	

FINAL INSTAR LARVA

On a superficial level, larvae of *Mimopeus* are very difficult to distinguish from each other specifically. The following description is based on larvae of two species only *M. elongatus* and *M. opaculus*. This covers two of the three species groups here recognised, but may have to be modified slightly when the larvae of the other species are known. The description is confined mainly to characters considered by van Emden (1947) to be of generic or tribal importance.

Body elongate, cylindrical, fairly heavily sclerotised. Head dark brown, remainder of body yellowish to dark brown.

Head. Labrum with 2 long discal setae, 2 long lateral setae and 2 pairs of shorter setae within outer angle. Mandible with a dorso-lateral elevation bearing a pair of stout setae. Frontoclypeus bearing anteriolaterally on each side a pair of stout setae, and one more slender seta on each side near basal margin. Ocelli small with one pair on each side. Antennae 2 - segmented. Mouthparts of typical tenebrionid type, maxillary mala with a spur towards apex of inner edge. Epicranial suture faint. Genae and postgenae bearing numerous setae.

Key to Table 3

X Character exhibited by **all** members of relevant species.
M Character exhibited by **most** members (> 70%)
S Character exhibited by **some** members (30-70%)
F Character exhibited by **few** members (< 30%)

1. Granules visible at 25x magnification present on pronotum.
2. Granules visible at 25x magnification present on elytra.
3. Granules visible at 25x magnification present on prosternum.
4. Granules visible at 25x magnification present on epipleuron.
5. Pronotal microsculpture visible at 25x magnification.
6. Elytral microsculpture visible at 25x magnification.
7. Aedeagus of *rugosus* type.
8. Aedeagus of *opaculus* type.
9. Aedeagus of *granulosus* type.
10. Aedeagus of *intermediate* type.
11. Base of elytra rounded.
12. Base of elytra marked by distinct raised carina.
13. Elytra shoulder prominent narrowly rounded.
14. Outer angle of anterior tibia dentate (approximately as in fig.)
15. Elytral costae plainly visible to naked eye.
16. Pronotal punctation of *humeralis* type.
17. Pronotal punctation of *opaculus* Banks Pen. type.
18. Pronotal punctation of *granulosus* type (coarse, steep-sided, fig.)
19. Elytral submarginal channel narrower than in *humeralis*.
20. Elytral submarginal channel inner angle distinct.
21. Setae of discal elytral punctures visible at 25x magnification.
22. Maxillary emargination dentate laterally.

Table 4. Dimensions for species and distinct populations of *Mimopeus*.

Species and distinct populations of *Mimopeus*	LENGTH mm Min.	Max.	WIDTH mm Min.	Max.
elongatus Northland	8.8	13.8	4.4	7.6
West Coast	9.2	12.3	4.7	6.1
Cook Strait	9.2	11.8	4.9	6.3
neglectus	8.9	11.4	4.8	6.2
elongatus Otago-Southland	8.6	10.0	4.5	5.3
turbotti	11.5	14.9	6.4	7.8
pascoei	9.8	14.2	5.4	7.9
subcostatus	9.1	11.2	4.7	6.2
humeralis	9.6	12.0	4.8	6.2
thoracicus	8.2	10.9	4.5	5.8
vallis	8.7	11.3	4.3	5.9
parvus	8.2	11.3	4.2	5.6
parallelus	8.8	11.8	4.8	6.1
buchanani	10.0	16.0	4.9	9.4
lateralis	11.1	14.7	6.1	7.6
opaculus South I	14.1	17.6	7.3	10.2
Otago	13.1	17.9	7.2	9.8
Stewart I	13.6	16.3	8.0	9.1
Central North I	14.0	18.5	7.2	11.2
Banks Pen.	15.0	19.7	7.8	10.2
Cook Strait	18.5	22.8	10.1	12.8
Waiheke I (?)	13.8	16.3	6.8	8.3
Cuvier I	16.6	19.2	8.9	10.0
insularis	19.6	22.8	9.3	11.4
impressifrons Central Otago	10.9	15.4	5.4	8.3
lewisianus	12.8	14.7	6.6	7.8
costellus	13.6	17.2	7.1	8.9
clarkei	10.6	14.2	5.7	7.0
granulosus	10.1	13.1	5.2	6.7
tibialis	10.4	14.2	5.6	7.6
convexus	11.0	14.4	5.5	7.6
rugosus	10.7	12.6	5.4	6.6

Thorax. Pronotum elongate, bearing 4 prominent setae, the first 2 on lateral slope near anterior edge, the second 2 on lateral slope near posterior edge. Mesonotum and metanotum each with 2 prominent setae in line with those of pronotum. A second row with the same number of setae as the upper row runs along the lower lateral slopes of the nota. Sternites bear a few small setae laterally.

Front legs stout, all parts at least twice as long as mid and hind legs. All coxae bearing numerous setae anteriorly and posteriorly, femora and tibio-tarsi bearing spines on inner edge and setae on outer surface.

Abdomen. First abdominal sternite bearing about 10 setae on each side near anterior margin, and a single pair, one on each side, near posterior edge. Segments 2 - 8 each with one pair of setae near posterior margin of tergite, and 2 pairs, one anterior and one posterior, on each sternite.

Anus and anal tubes at base of ninth segment. Ninth segment (see Fig.105) sternite very short, bearing a number of short and 4 long setae. Dorsal part of ninth tergite convex, bearing 4 long setae near its anterior border, 4 long setae on the posterior edge and 4 short spines, 2 between the outer pair and 2 between the inner pair of long setae. Ventral part of ninth tergite bearing 7 long slender setae on each side.

Dimensions. Head width: 2.7 (*elongatus*) — 3.6 mm (*opaculus*).

KEY TO SPECIES OF *MIMOPEUS*

1 Aedeagus as in Figs.103-104, apicale very slender, basale relatively stout. Basal elytral carina raised, sharp. Outer angle of anterior tibiae strongly dentate (Fig.101). Elytral costae usually plainly visible to naked eye. Elytral submarginal channel very narrow and poorly defined ..... RUGOSUS SPECIES GROUP 2

Aedeagus not as in Figs.103-104, apicale not as slender 3

2 Elytral costae very distinct (Fig.48). Pronotal, elytral and sternal punctures very large, deep and steep-sided. Hairs of elytral punctures stout, projecting well beyond borders of punctures on lateral and hind slopes, clearly visible at 25 x magnification. Colour dull reddish grey. South Canterbury, Otago, Southland ..... **rugosus**

Elytral costae not very distinct. Pronotal, elytral and sternal punctures relatively small and shallow. Hairs of elytral punctures very fine and short, usually not visible at 25 x magnification. Colour shining dark reddish black. Fig.96. Mackenzie Basin, South Canterbury ..... **convexus**

3 Outer apical angle of anterior tibia sharply dentate (Fig.100,t), with a distinct "sinus" (s) between the tooth and the basal articulation of the tarsi. Lateral angle of postgenal emargination at base of cardo dentate (Fig.97). Aedeagus moderately stout (Fig.99). Basal elytral carina raised, sharp. Elytral submarginal channel obsolete. Form convex. Canterbury ..... TIBIALIS SPECIES GROUP **tibialis**

Outer apical angle of anterior tibia not sharply dentate, tibial apex lacking a distinct "sinus" (Figs.85, 102), lateral angle of postgenal emargination not dentate 4

4 In lateral view dorsal surface of apicale of aedeagus distinctly concave (cf.Figs.79-82, 84, 93). Basale of aedeagus stout in dorsal view, not strongly tapered or sinuate. Usually large beetles exceeding 14mm in length and 7.5mm in width *and/or* elytral costae clearly visible to naked eye *or* elytral submarginal channels absent. 5

In lateral view dorsal surface of apicale of aedeagus convex or flat, never distinctly concave. Basale of aedeagus slender (usually) *or* strongly tapered *or* sinuate in dorsal view 10

5 Base of elytra rounded off, not represented by a sharp edge. Shoulder broadly rounded, not prominent (Figs.56-64). Inner angle of elytral submarginal channel not distinct ..... OPACULUS SPECIES GROUP 6

Base of elytra represented by a sharp edge, often in the form of a raised carina. Shoulder narrowly rounded, moderately prominent (Fig.20). Inner angle of elytral submarginal channel distinct..... ..... GRANULOSUS SPECIES GROUP (part) 9

6 Elytral costae clearly visible to naked eye. Elytral shoulder very broadly rounded, almost obsolete (Fig.57). Convex. Elytra distinctly wider than pronotum. Aedeagus as in Fig.82. Submarginal channel of elytra sloping downwards, not flat. Poor Knights Islands, North Auckland ..... **insularis**

Elytral costae not clearly visible to the naked eye, often obsolete. Elytral shoulder not as broadly rounded (Figs. 56, 58-64) 7

7 Elytral submarginal channels very narrow or absent. Form moderately convex, elongate oval. Punctation usually fine and shallow, discal pronotal and elytral punctures often separated by more than 2 x their own diameter (Figs. 84, 85). Mackenzie Basin and inland Otago. ..... **impressifrons**

Elytral submarginal channels relatively broad. Form fairly flattened, broadly oval (Figs. 56, 58-64) 8

8 Apicale of aedeagus more elongate (Figs.73-81, cf. also Figs.24, 83, 86-92). Pronotal punctures larger and deeper, those of disc separated mostly by about their own diameter. North Island, excluding extreme north; South Island east of main divide; Stewart Island ..... **opaculus**

9 Large granules present on elytron, especially on lateral and hind slopes, clearly visible at 25 x magnification. Dorso-lateral and ventro-lateral angles of apicale rounded, not carinate. Macropunctures large, deep, and steep-sided, rarely separated by more than their own diameter on pronotum. (Figs.51, 93) South Marlborough and north Canterbury ..... **costellus**

Granules absent from elytra. Dorso-lateral and ventrolateral angles of apicale carinate at base. Macropunctures smaller and less steep-sided; rarely separated by less than their own diameter on pronotum. Known only from Mt. Percival, north Canterbury ..... **johnsi**

10 Macropunctures of pronotum and elytra large, deep and steep-sided; separated by less than their own diameter (Figs.20, 54). Elytral costae clearly visible to naked eye Banks Peninsula .... GRANULOSUS SPECIES GROUP **granulosus**

Macropunctures of pronotum and elytra smaller (often very small), usually separated by more than their own diameter (Figs.16-19, 47, 49, 54). Elytral costae rarely visible to naked eye ..... ELONGATUS SPECIES GROUP 11

11 Discal elytral punctures bearing hairs visible at 25 x magnification. Form broadly oval, fairly flat (Fig.52). Punctures of pronotum and elytra moderate, approximately as in *M. opaculus* (Fig.23). Dorsal microsculpture strong. Shoulders narrowly rounded. Base of elytra sharply marked but not raised ..... BUCHANANI SUPERSPECIES 12

Discal elytral punctures not bearing hairs visible at 25 x magnification. Form usually elongate oval, convex (Figs. 16, 47). Other characters not all present in combination 13

12 Granules visible at 25 x magnification on pronotum, at least laterally. Inner angle of elytral submarginal channel distinct. (Figs. 45, 52, 66). South Marlborough, Canterbury ..... **lateralis**

Granules visible at 25 x magnification absent from pronotum. Inner angle of elytral submarginal channel completely obsolete. (Figs. 65, 67, 68). Vicinity of Wellington city, Cook Strait islands, northern Marlborough, east Nelson ..... **buchanani**

13 Elytral shoulder narrowly rounded (Figs. 46, 47, 49), often prominent. Base of elytra sharply marked, often represented by a raised carina. Aedeagus slender and small ..... HUMERALIS SUPERSPECIES 14

Elytral shoulder broadly rounded (Figs. 16-19, 42, 43), not prominent. Base of elytra usually rounded off, very rarely marked by a raised carina. Aedeagus usually relatively stout ..... ELONGATUS SUPERSPECIES 18

Basale of aedeagus tapering considerably in dorsal view apicale very small and slender (Fig.28). Wellington south coast, Wairarapa Hawkes Bay, Marlborough ..... **neglectus**

14 Elytral costae plainly visible to naked eye, separated by rows of irregular foveae composed of confluent punctures (Fig.55). Interstices between elytral punctures highly polished, microsculpture very weak, scarecely visible at 100 x magnification. Lower Clarence Valley, Marlborough ..... **parallelus**

Elytral costae not, or scarcely, visible to naked eye; elytral punctures discrete, not running together to form foveae. Elytral interstices dull, microsculpture visible at 25 x magnification 15

15 Aedeagus relatively large and not very slender (Figs. 40, 41). Basal carina of elytra not raised at all. Shoulder not prominent (Fig.49). Submarginal channels of elytra very narrow, inner angle obsolete 16

Aedeagus smaller or very slender (Figs. 35, 38). Basal carina of elytra raised. Shoulder prominent (Figs. 47, 50). Submarginal channels of elytra broader, inner angle distinct 17

16 Granules, clearly visible at 25 x magnification, present on elytra. Dorsal microsculpture very strong, visible at 10 x magnification. Punctures rather deep and steep-sided. Awatere Valley, Marlborough, from Upcot northwards ..... **vallis**

Granules absent from elytra. Dorsal microsculpture not visible at 10 x magnification. Punctures shallower and not as steep-sided. Molesworth, Awatere Valley, and Mt Percival, near Hanmer ..... **parvus**

17 Aedeagus elongate and very slender (Fig.35). Form of body elongate, parallel-sided (Fig.47). Wellington southern coasts ..... **humeralis**

Aedeagus less elongate and relatively stouter (Fig.38). Form of body more broadly oval, less parallel-sided (Fig.50). South Marlborough, Canterbury, Otago, mainly coastal ..... **thoracicus**

18 Elytral submarginal channels distinct and broad to beyond mid-length, epipleural carina reflexed outside them (Figs. 22, 42-45). Chatham Islands ..... **pascoei**

Elytral submarginal channels indistinct and usually narrow, inner angle completely obsolete, epipleural carina not or barely reflexed (Figs. 16-19, 21)..... 19

19 Aedeagus as in Fig.29. Granules clearly visible at 25 x magnification present on pronotum. Submarginal channels of pronotum and elytra broad. Three Kings Islands..... **turbotti**

Aedeagus not as in Fig.29 (cf.Figs. 3, 25-28, 30-32). Granules usually absent on pronotum or very small. Submarginal channels of elytra narrow, those of pronotum usually narrow and indistinct. Coastal North Island, South Island excluding Canterbury, Stewart Island ..... **elongatus**

Mimopeus neglectus sp.n. (Figs.18,28)

Like *M. elongatus* this species is coastal around part of the coast of the North Island. Watt (1961) regarded it as a sub-species of *M. elongatus* but there is a constant morphological gap between the two taxa which is best formally recognised by regarding *neglectus* as a full species.

Distinguished from *M. elongatus* in the structure of the aedeagus which in *M. neglectus* is more strongly acuminate apically (Fig.28). It is distinguished from *M. humeralis*, with which it occurs sympatrically and with which it was frequently confused in collections, by the stout, less elongate aedeagus, shining pronotum, broadly oval form, broadly rounded elytral shoulders, complete absence of carinae at the elytral bases and narrower and less clearly defined sub-marginal channels (Fig.18).

MALE

Elongate oval, convex (fig.18), colour reddish brown or reddish black, undersurface shining reddish brown to reddish black.

Dorsal surface. Antennae similar to fig.7, basal segments covered with stout semi-erect setae, which become shorter and finer towards the apex. Terminal three segments bearing fine, whitish pubescence, microsculpture of surface strong and irregular, clearly visible at 25x magnification; other segments shining, microsculpture visible at 100x magnification. Labrum emarginate, finely punctate, each puncture bearing a moderately long yellow seta. Head similar to fig. 3, eyes generally extending slightly further laterally than genae, clypeus emarginate anteriorly, clypeal sutures indistinct, frons slightly depressed behind clypeus. Upper surface of head finely punctured, punctures shallow, with gently sloping slides, interstices smooth, bearing some small micropunctures just visible at 100x magnification, microsculpture weak, visible at 100x magnification. Punctures become smaller towards front and lateral margins of head.

Pronotum moderately convex, individually variable in shape, sometimes without the sinuation before the posterior angles, when distance across posterior angles is less. Punctures of pronotum small and shallow, with gently sloping sides, sparse on disc, separated by more than twice their own diameter, more closely set towards base and marginal channels. Micropunctures barely visible at 100x magnification. Interstices smooth and shining, microsculpture weak, visible at 100x magnification; a few small raised dome-shaped granules present in submarginal channels. Scutellum triangular strongly transverse. Base of elytra rounded off. There are small shining granules on disc visible at 100x magnification. Epipleural carina distinctly upturned outside marginal channel at shoulder.

Ventral surface. Punctures of postgenae small and shallow, gular with transverse furrows very shallow and obscure. Prosternal granules very small. Submarginal grooves of fourth visible abdominal sternite almost obsolete.

Aedeagus (Fig.28). Aedeagus long and slender with apicale tapering strongly to apex as in figure.

FEMALE

Like male, but legs shorter and more slender, often difficult to distinguish without dissection.

DIMENSIONS

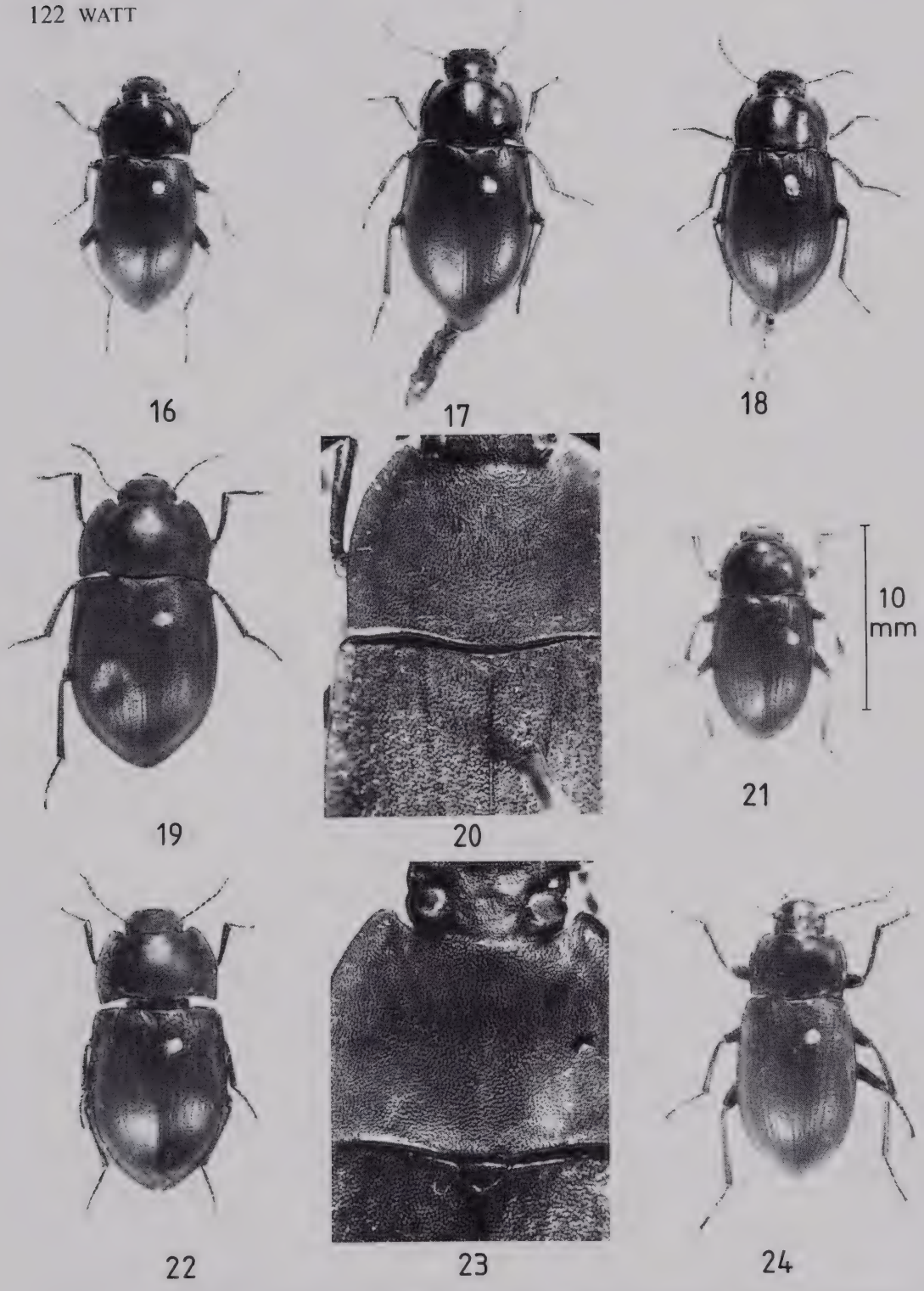
Length 10.0 mm, width 5.2 mm.

TYPE MATERIAL. Holotype ♂. Sinclair Head, Wellington 25 April 1942 C.E. Clarke, C.E.C./AMNZ. Allotype ♀ with same data as holotype, C.E.C./AMNZ Paratypes (9) with same data as holotype, C.E.C./AMNZ. Paratypes (6) with same data as holotype, C.E.C./BMNZ. Paratypes (3) Red Rocks, Wellington 29 August 1941, R.R. Forster, NMNZ. Paratypes (8) Red Rocks, Wellington under *Coprosma acerosa* 5 January 1959 J.C. Watt, J.C.W./NZAC.

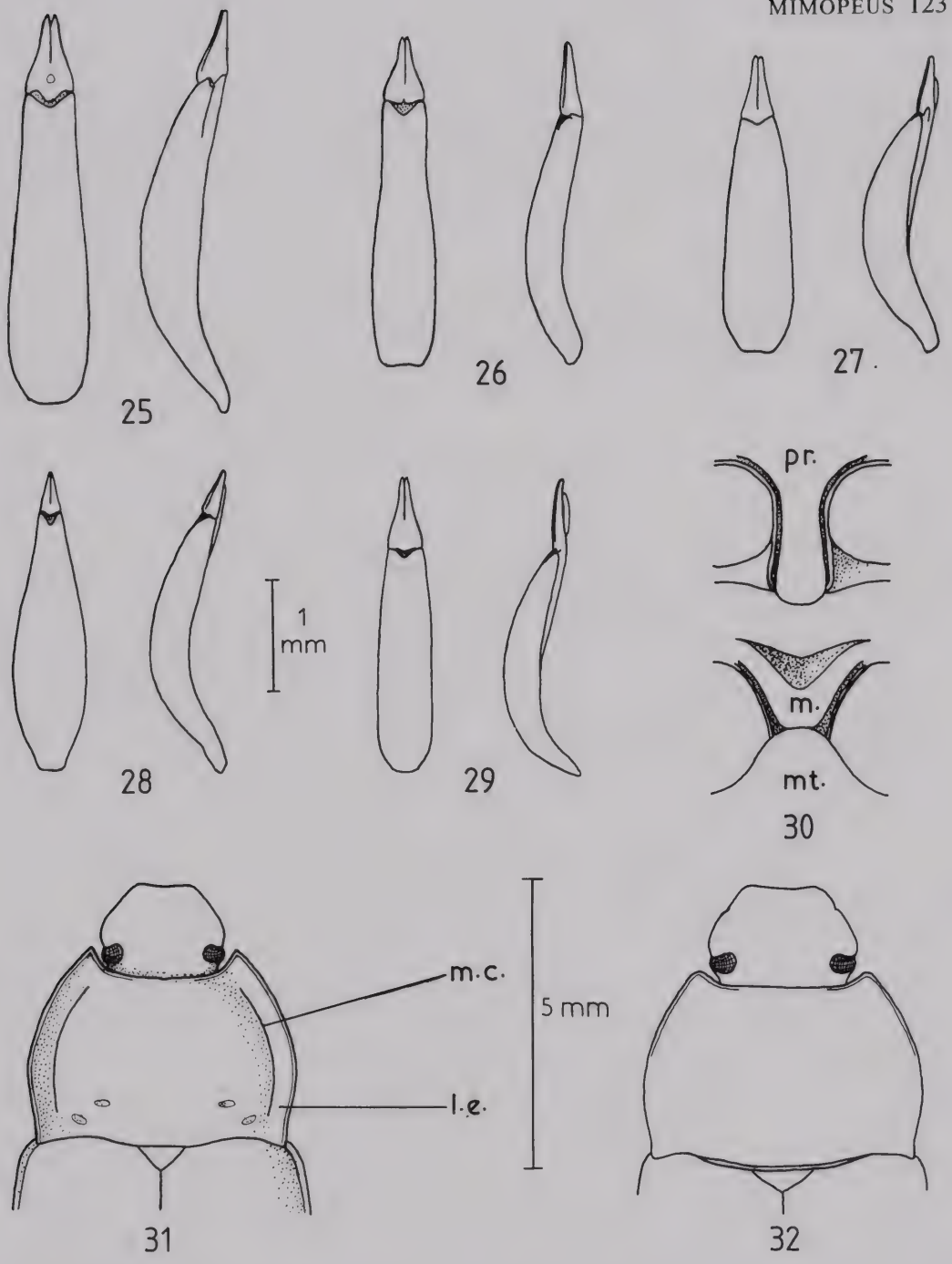
TYPE LOCALITY. Sinclair Head, Wellington.

Material examined. Holotype ♂allotype ♀, 26 paratypes, other specimens.

Distribution. Wellington: Red Rocks, Sinclair Head, Lyall Bay, Wilton's Bush, Makara Beach, Mana Island, Hutt Valley, Lowry Bay, Muritai, Pencarrow, Lake Wairarapa, Castlepoint. Hawkes Bay: Hastings, Rissington, Napier Beach, near Mahia Beach. Marlborough: Mouth of Wairau River, Kaikoura, Picton.
Ecology. Coastal Wellington from Makara eastwards, Wairarapa, Hawkes Bay.



Figs. 16-24. *Mimopeus* spp. 16. *M. elongatus*, West Coast form. 17. *M. elongatus*, Whangaruru South. 18. *M. neglectus*, Red Rocks, Wellington. 19. *M. turbotti*, Three Kings Islands. 20. *M. costellus*, Loburn. 21. *M. elongatus* (huttoni) Otago. 22. *M. pascoei*, Chatham Islands. 23. M. opaculus, Central North Island form. 24. *M. opaculus*, Inland Otago form.



Figs.25-32. *Mimopeus* spp. Head and thorax, and aedeagus. 25. *M. elongatus,* Bay of Islands. Aedeagus. 26. *M. elongatus,* Bethells Beach. Aedeagus. 27. *M. elongatus,* Stephens I. Aedeagus. 28. *M. elongatus,* Red Rocks Wellington. Aedeagus. 29. *M. turbotti,* holotype male. Aedeagus. 30. *M. elongatus,* Bay of Islands. Ventral view of prothorax and mesothorax, legs omitted. 31. *M. elongatus,* West Coast form Pararaha. Head and prothroax, male. 32. *M. elongatus,* Mt Mangere. Head and prothorax, male.

pr. prothorax, m. mesothorax, mt. metathorax, m.c. marginal channels of pronotum, l.e. lateral expansion of sides of pronotum.

This species is often found under *Muhlenbeckia complexa* and occurs in fairly large numbers under several other coastal plants, marram grass, *Spinifex*, *Pimelia* sp., *Coprosma acerose*, *Disphyma australe* and *Hymenanthera crassifolia*.

Mimopeus turbotti sp.n. (Figs.19,29)

Most closely related to *M. elongatus*, readily distinguished form all known populations of the latter by the structure of the aedeagus (Fig.29), larger size, and broader form (Fig.19).

MALE

Broader and less convex than *M. elongatus*. Upper surface dull black, legs and antennae reddish black, undersurface shining black.

Dorsal surface. Labrum slightly emarginate anteriorly, punctures larger and deeper than in *M. elongatus*, yellow setae stout. Dorsal surface of head as in *M. elongatus* but punctures deeper and microsculpture of interstices very strong, clearly visible at 25 x magnification.

Pronotum (Fig.19) more transverse than in *M. elongatus* almost as broad as elytra, anterior and posterior angles blunter, apex more deeply emarginate, submarginal channels distinct, expansions outside them very broad and more strongly reflexed than in *M. elongatus* West Coast populations. Pronotal punctures larger, deeper, and more steep-sided than in *M. elongatus*, those of disc sparse, separated by more than twice their own diameter. Very few small punctures visible on interstices, most being replaced by granules, visible at 25 x magnification.

Scutellum triangular, transverse, finely and deeply punctate.

Elytra broader and less convex than in *M. elongatus*, submarginal channels broader, particularly at shoulder, which is broadly rounded as in *M. elongatus*. Punctures deep, rather steep-sided, separated by at least their own diameter, often by twice their own diameter, interstices bear distinct shining granules, larger than those of pronotum, elsewhere microsculpture strong, clearly visible at 25 x magnification. Costae are lacking, but there are irregular linear depressions visible with side-lighting.

Ventral surface. Mentum as in *M. elongatus*. Pregular region of postgenae more deeply and closely punctured, gular region finely punctate, interstices with a few small granules, setae of punctures stouter than in *M. elongatus*. Gula with very fine transverse striae just visible at 25 x magnification, and with a few broad, indistinct, transverse depressions.

Prosternal intercoxal process broader posteriorly than in *M. elongatus*, prosternum bearing a few small granules. Proepisternum with strong microsculpture, finely punctate, outer margins distinctly reflexed so that prothoracic margin is more distinctly foliate than in any other species of the genus.

Mesosternal intercoxal process narrower than in *M. elongatus* submarginal grooves very indistinct. Metasternum finely punctate, interstices without granules, metepisternum more deeply punctured than metasternum. Abdominal sternites shining, slightly rugose longitudinally, finely punctured. Distinct submarginal grooves present on all except first visible sternite.

Epipleura of elytra with strong microsculpture, bearing scattered granules visible at 25 x magnification.

Legs. As in *M. elongatus*.

Aedeagus (Fig.29). Slender, smaller than in most populations of *M. elongatus*. In dorsal view basale parallel-sided, apicale slender and relatively elongate. Slender in lateral view, not strongly curved, apicale arched.

FEMALE

Like male, often slightly broader, averaging larger, but very difficult to distinguish without dissection.

DIMENSIONS (Tables 1,2)

Range. Length 12.2-15.8 mm, width 5.8-8.2 mm.

TYPE MATERIAL. Holotype ♂. Great Island, Three Kings Islands, 3.v.46, E.G. Turbott. Eastern division, under stones near Quadrats I & II, AMNZ. Allotype ♀ with same data as holotype, AMNZ. Paratypes with same data as holotype, (30) AMNZ; (2) BMNH; (2) CMNZ; Great Island, 1.v.1946, E.G. Turbott, under large stones with *Placostylus bollonsi*, seaward slopes above Crater Head, (10) AMNZ; (2) NMNZ; (2) NZAC. Big King I., C. Fleming, (3) A.E. Brookes Coll./NZAC.

TYPE LOCALITY. Great Island, Three Kings, ca. 40.2 km (25 miles) north-west of Cape Reinga.

Material Examined. Holotype ♂, allotype ♀, 51 paratypes, 85 other specimens.

Distribution and Ecology. Confined to the Three Kings Islands, where it occurs on Great Island and South West Island. Common under stones and fallen branches and adults common on ground at night. Larvae occur in friable soil rich in humus and occasionally in dry rotten wood.

This species is named in honour of Mr E.G. Turbott, former Director of Auckland Museum and a member of the Hauraki Gulf Maritime Park Board, who collected the majority of the extensive collection of Three Kings Is insects in the Auckland Museum.

Mimopeus insularis sp.n. (Figs.57,72,82)

Most closely related to *M. opaculus*.

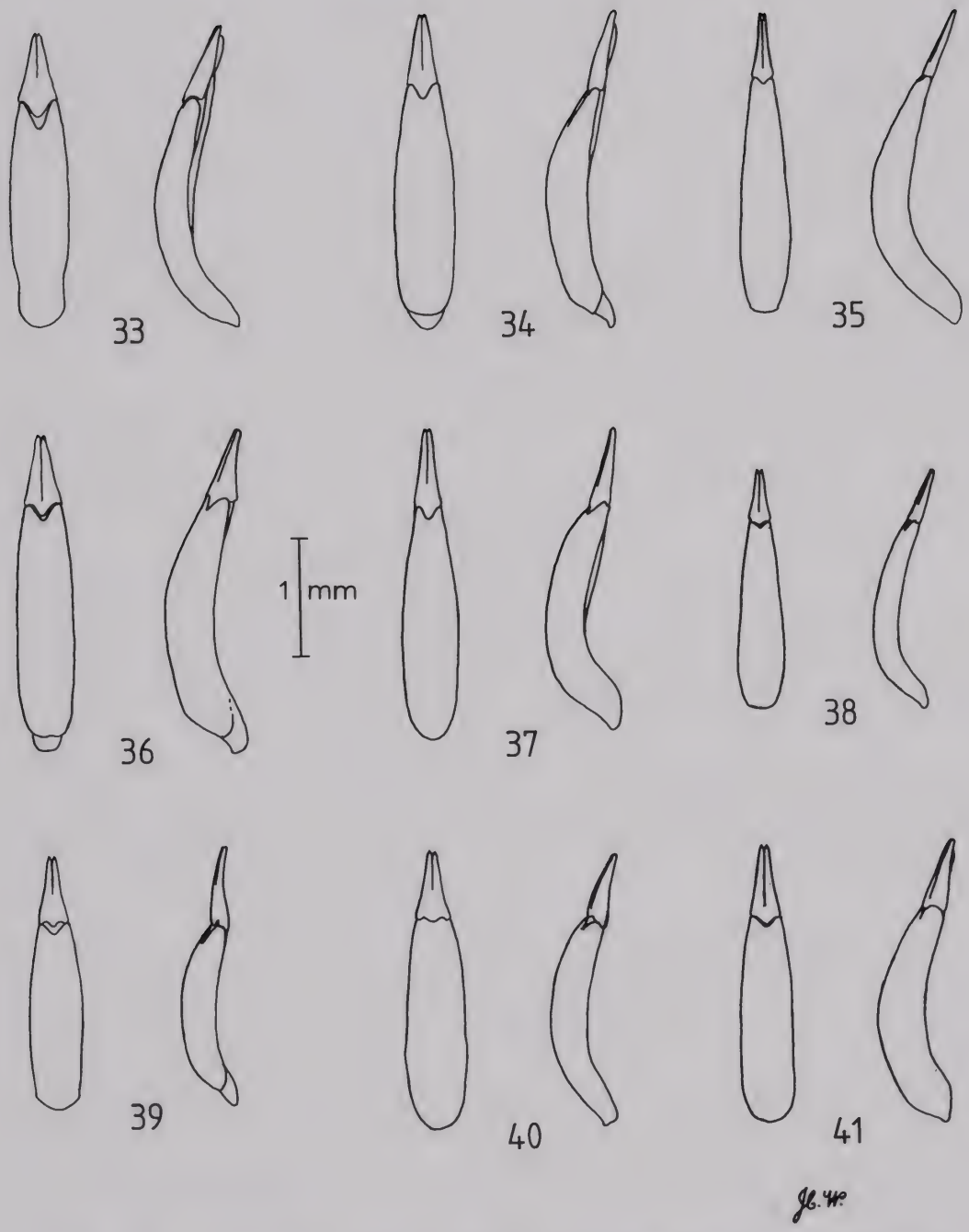
MALE

Colour dull greyish or reddish black, undersurface shining black.

Dorsal surface. Antennae similar to those of *M. opaculus*, terminal segment noticeably longer than broad, and yellow pubescence of last 4 segments denser. Labrum barely subtruncate anteriorly (Fig.72), not emarginate as in *M. opaculus* (Fig.71). Clypeus emarginate anteriorly, punctures as in *M. opaculus* clypeal suture distinct. Eyes relatively large, more prominent laterally than genal margin, with a more or less distinct transverse impression on the front between them. Punctures of front and vertex shallow.

Pronotum convex, anterior emargination shallow, sides strongly curved. Lateral based depressions present. Punctures, especially of disc, shallow with gently sloping sides. In any particular region there are approximately the same number of punctures as in *opaculus* per unit area. Interstices between punctures flat, bearing strong microsculpture which is, however, so fine that it is barely visible at 25 x magnification.

Scutellum triangular, transverse, with small, shallow punctures.



Figs.33-41. *Mimopeus* spp. Aedeagus. 33. *M. pascoei*, Glory Bay, Pitt I, Chathams. 34. *M. pascoei*, Forty fours, Chathams. 35. *M. humeralis*, Sinclair Head. 36. *M. pascoei*, Sisters, Chathams. 37. *M. subcostatus*, Chathams. 38. *M. thoracicus*, Christchurch. 39. *M. parallelus*, holotype. 40. *M. parvus*, holotype. 41. *M. vallis*, holotype.

Elytra oval, sides more strongly curved than in any populations of *M. opaculus*, relatively narrower at shoulders and wider at mid length. More convex than in *opaculus* lateral slopes steep, sides slope down to epipleural carina and position of obsolete submarginal channel is barely indicated. The three primary costae are present as well developed, rounded ridges, while there are traces of secondary costae, one between each primary costa. Large punctures shallow, with sides rather steeper than those of pronotum, small punctures very shallow. Interstices quite flat, microsculpture strong. Punctures become almost obsolete on surface of submarginal "channel". Dorsal surface lacks granules.

Ventral surface. Mentum transverse, punctures distributed as in *M. opaculus* but smaller and shallower. Area between maxillary base and gula with a few indistinct punctures, compared with *M. opaculus* in which the punctures are distinct. Punctation of remainder of undersurface of head similarly sparse and shallow. Gula relatively broader than in *M. opaculus*.

Prosternum smoother than in *M. opaculus*, punctures very indistinct; a few small granules present laterally. Prosternal intercoxal projection almost identical in shape with that of *M. opaculus* but punctures very small, shallow and indistinct. Mesosternal intercoxal process almost as broad as that of southern *M. opaculus*, unlike the narrow process of northern populations. Anterior intercoxal process of metasternum with submarginal groove almost obsolete, metasternum and metepisternum with punctures so indistinct as to be almost indistinguishable.

Sternites of abdomen like those of *M. opaculus* except that intercoxal projection without submarginal groove in middle.

Epipleura of elytra impunctate, with very strong microsculpture (visible at 25 x magnification), without granules.

The whole undersurface bears much stronger microsculpture than in *M. opaculus* and thus appears duller to the naked eye.

Legs. As in *M. opaculus*.

Aedeagus (Fig.82). Differs from that of *M. opaculus* in lateral view in that basale relatively stouter. In dorsal view, apicale with sides barely sinuate, base relatively narrower, sides of basale relatively more strongly curved.

FEMALE

Like male but usually larger and relatively broader. The sexes are very difficult to distinguish without dissection.

DIMENSIONS

Measurement	*Mean*	*S.D.*	*C.V.*	*Range*	*Number*
Pr.L.	5.26 mm	0.19 mm	3.6	4.8- 5.6 mm	20
E1.L.	16.18 mm	0.74 mm	4.6	14.9-17.4 mm	20
Pr.L + E1.L.	—	—	—	19.6-22.8 mm	20
Pr.W.	8.54 mm	0.44 mm	5.2	7.7- 9.2 mm	20
Ap.W.	4.94 mm	0.25 mm	5.0	4.3- 5.6 mm	20
H.W.	3.98 mm	0.16 mm	4.0	3.7- 4.2 mm	20

Range. Width 9.3-11.4 mm

TYPE MATERIAL. Holotype ♀. Tawhiti Rahi, Poor Knights Islands, xi.45. coll. Auckland Museum, AMNZ. Allotype ♂. Tawhiti Rahi, under stone, ca 1.i.56. J.C. Watt, NZAC. Paratypes. Same data as holotype, (♂ ♀) NZAC; same data as

allotype (2 ♂♂ 3 ♀♀) J.C.W./AMNZ. Poor Knights, A.W.B. Powell, March 1934, (2♀♀) NZAC. Tawhiti Rahi, Poor Knights Is., 23.xii.52, J.S. Edwards, (♀) AMNZ.

TYPE LOCALITY. Tawhiti Rahi, Poor Knights Is (*ca.* 50 km N.E. of Whangarei).

Material Examined. Holotype ♂, allotype ♀, 17 paratypes; 5 other specimens. Tawhiti Rahi, under stone *ca.* 1 Jan. 1956, J.C. Watt, (2) J.C.W./AMNZ (damaged specimens). Tawhiti Rahi, 21 Jan. 1943, Majors Buddle and Wilson, (1) NZAC. (damaged). Aorangi I., Poor Knights, 24 Apr. 1961, F.J. Newhook, (♂ ♀) NZAC.

Distribution. Apparently confined to the Poor Knights Islands. It is frequent under stones and in soil on Tawhiti Rahi, the largest island of the group. (Note. "Tawhiti rahi" (Maori) probably means "the great snare".)

Mimopeus parvus sp.n. (Figs. 40,49)

Most closely related to *M.vallis*, resembling also *M. thoracicus*, *M. humeralis* and *M. elongatus* in some respects. Readily distinguished from *M. humeralis* and *M. thoracicus* by the stouter aedeagus, rounded elytral shoulders, narrower and less distinct elytral submarginal channels and smoother, non-granulate elytral interstices. The aedeagus is rather like that of *M. elongatus* (Cook St populations), but the apicale is more elongate and the basale is not as stout. Differs from all populations of *M. elongatus* also in the humeral angles, which are more prominent, the basal carinae of the elytra which are sharp, although not at all raised, the absence of elytral granules and the smoother elytral interstices. Dorsal punctation rather like that of *M. impressifrons*, but there are many important differences between the two species, and the few resemblances may be attributed to convergence. Compared with *M. vallis* below.

MALE

Convex, elongate oval, rather parallel-sided. Dorsal surface black, moderately shining, ventral surface shining black, legs and antennae dark reddish-black.

Dorsal surface. Anterior of labrum very light in colour, emarginate. Antennae as in *M. vallis*. Head broad, microsculpture weaker than in *M. vallis*, barely visible at 25 x magnification. Pronotum more convex and sides more strongly curved than in *M. vallis*, submarginal channels obsolete; punctures small, shallow and relatively sparse, all separated by more than twice their own diameter on disc, few micropunctures visible at 25 x magnification; microsculpture weak, barely visible at 25 x magnification; interstices flat, granules absent. Scutellum bearing a few scattered, relatively large, punctures. Elytra convex, sides almost parallel. Shoulder narrowly rounded but not prominent, submarginal channels narrow, inner angle more distinct than in *M. vallis*. Carina at base of elytra sharp, but not at all raised. Punctures shallower, smaller and less distinct than in *M. vallis*; microsculpture much weaker, barely visible at 25 x magnification, granules absent.

Ventral surface. Granules present on prosternum, proepisternum and epipleura, absent from postgenae, mesosternum, metasternum and metepisternum, very weak on lateral parts of visible abdominal sternites 1 and 2. Postgenal emargination at base of cardo slightly raised laterally, but not dentate. Punctures of prosternum larger and deeper than in *M. vallis*, but punctures of other ventral sclerites smaller and shallower. Posterior part of prosternal intercoxal process more prominent than in *M. vallis*, other intercoxal processes approximately as in *M. vallis*.

Legs. As in *M. vallis* except punctures of femora, which are smaller and shallower.

Aedeagus (Fig.40). In dorsal view apicale less elongate, sides more strongly sinuate and base broader than in *M. vallis*, more strongly curved downwards in lateral view. Basale slightly more slender in lateral view.

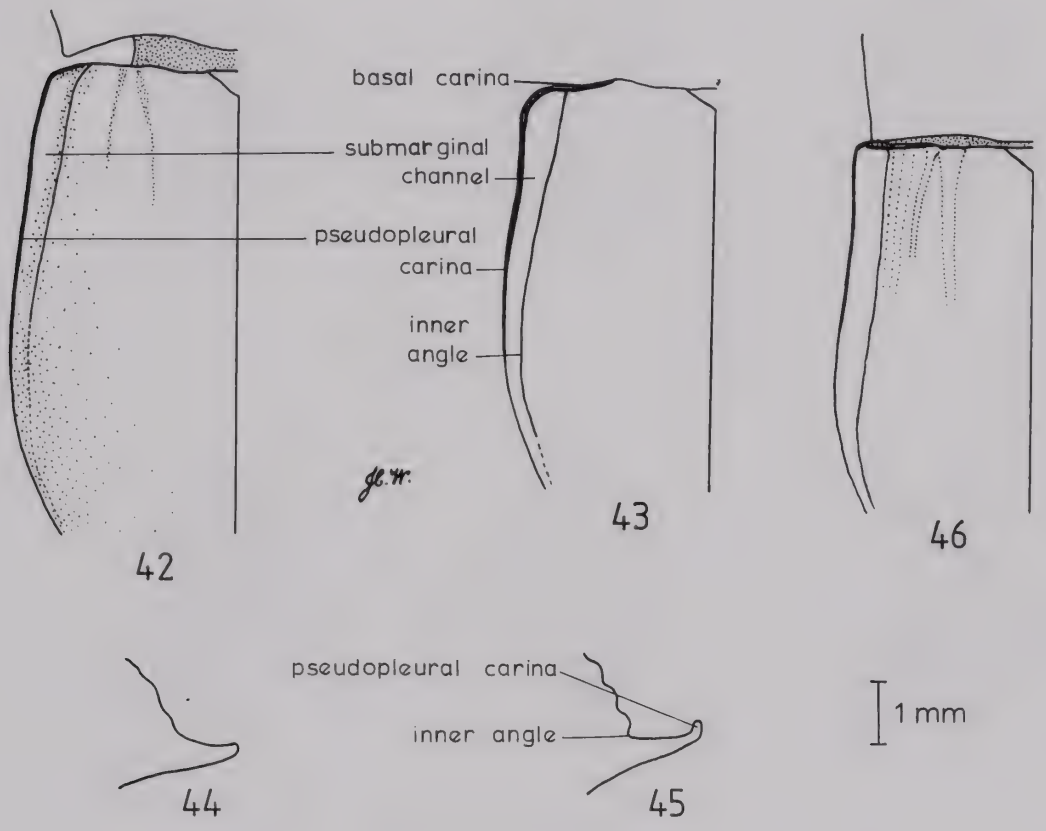
FEMALE

Legs slightly shorter than in male, otherwise difficult to distinguish.

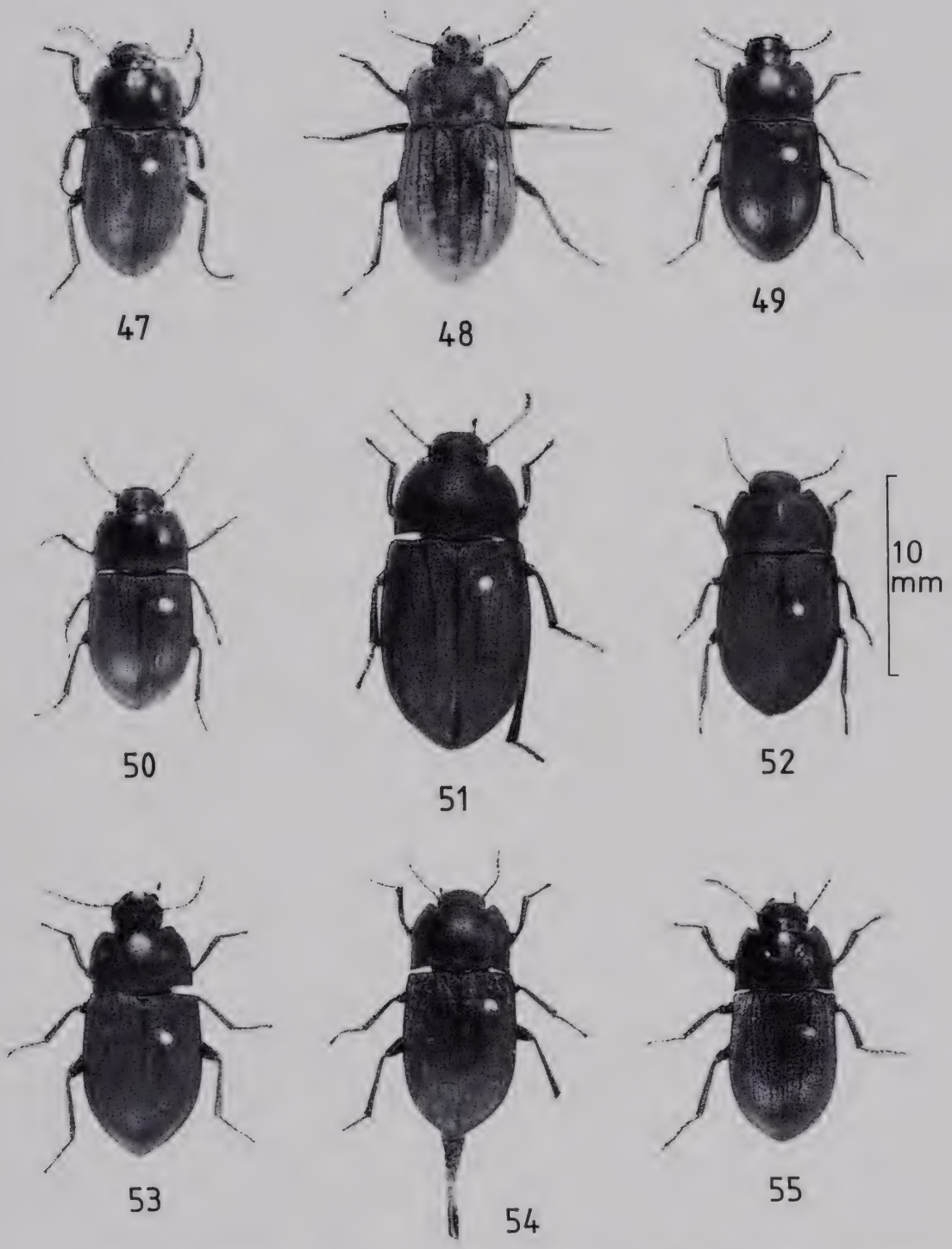
DIMENSIONS

	Holotype ♂	*Allotype* ♀
Length	9.8 mm	9.6 mm
Width	4.9 mm	4.9 mm

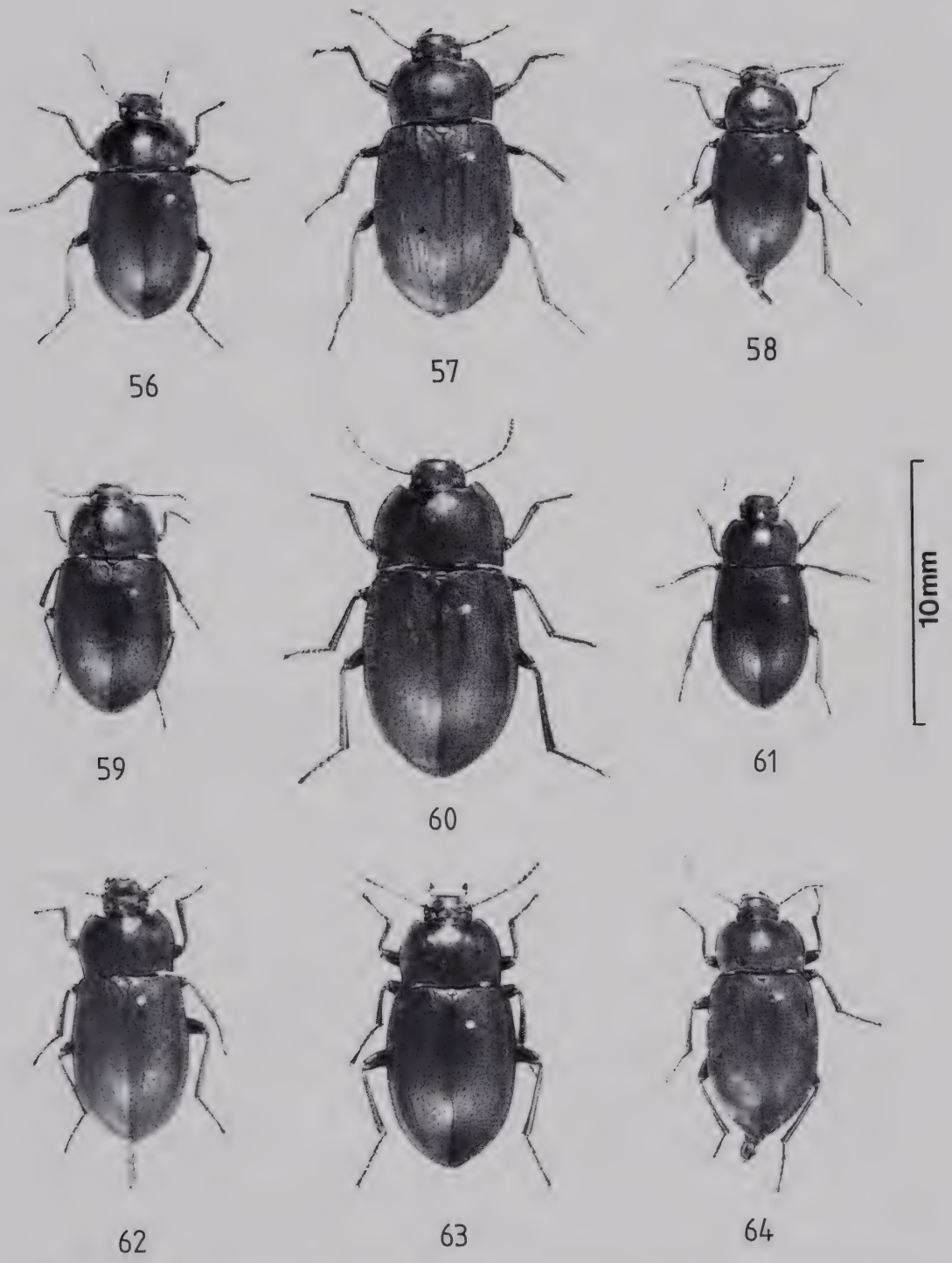
Range (entire species). Length 8.2-12.6 mm, width 4.2-5.7 mm.



Figs. 42-46. *Mimopeus* spp. Details of elytron. 42. *M. pascoei*, Glory Bay, Pitt I, Chathams. Left elytron. 43. *M. subcostatus*, Chatham Is. Left elytron. 44. *M. pascoei*. Diagrammatic section of lateral margin of elytron. 45. *M. subcostatus*. Diagrammatic section of lateral margin of elytron. 46. *M. parallelus*, Glen Alton, Clarence Valley. Left elytron.



Figs.47-55. *Mimopeus* spp. 47. *M. humeralis,* Wellington. 48. *M. rugosus.* Wedderburn. 49. *M. parvus,* Molesworth, Awatere Valley. 50. *M. thoracicus,* Lyttleton. 51. *M. costellus,* Loburn, Canterbury. 52. *M. lateralis,* Hanmer. 53. *M. clarkei,* Molesworth. 54. *M. granulosus,* Dyers Pass, Christchurch. 55. *M. parallelus,* Glen Alton, Lower Clarence Valley.



Figs. 56-64. *Mimopeus* spp. 56. *M. opaculus*, Stewart I form. 57. *M. insularis*, Tawhiti Rahi, Poor Knights Is. 58. *M. opaculus*, Central North I form, Gisborne. 59. *M. opaculus*, Mid-Canterbury form, Broken River, Canterbury. 60. *M. opaculus*, Cook Strait form, Stephens I. 61. *M. opaculus*, specimen labelled Waiheke I. 62. *M. opaculus*, Banks Pen. form, Akaroa. 63. *M. opaculus*, Central North I form, Silverstream. 64. *M. opaculus*, Cuvier I form.

GEOGRAPHICAL VARIATION

Specimens from Mt. Percival, near Hanmer differ very little from the Molesworth individuals. The postgenae have more uneven, almost granulate, interstices; the form is slightly less convex and more broadly oval; and the average size slightly larger.

TYPE MATERIAL. Holotype ♂. Molesworth, Awatere River, under stone, 25 Dec. 1943, C.E. Clarke, AMNZ. Allotype ♀ with same data as holotype, BMNH. Paratypes with same data as holotype; (2♂♂ 2 ♀♀) BMNH; (♂ ♀) AMNZ; (♂) NZAC.

TYPE LOCALITY. Molesworth, Awatere River, Marlborough. Presumably the types were collected fairly near the Molesworth Station homestead.

Material examined. Holotype ♂, allotype ♀, 9 paratypes, 9 other specimens: Mt Percival, 3000-4000ft. [*ca.* 915-1220 m], near Hanmer, 30 October 1962, P.M. Johns, (5) NZAC; (4) Johns.

Distribution. Known only from Molesworth, Marlborough, and Mt Percival, North Canterbury.

Mimopeus vallis sp.n. (Fig.41)

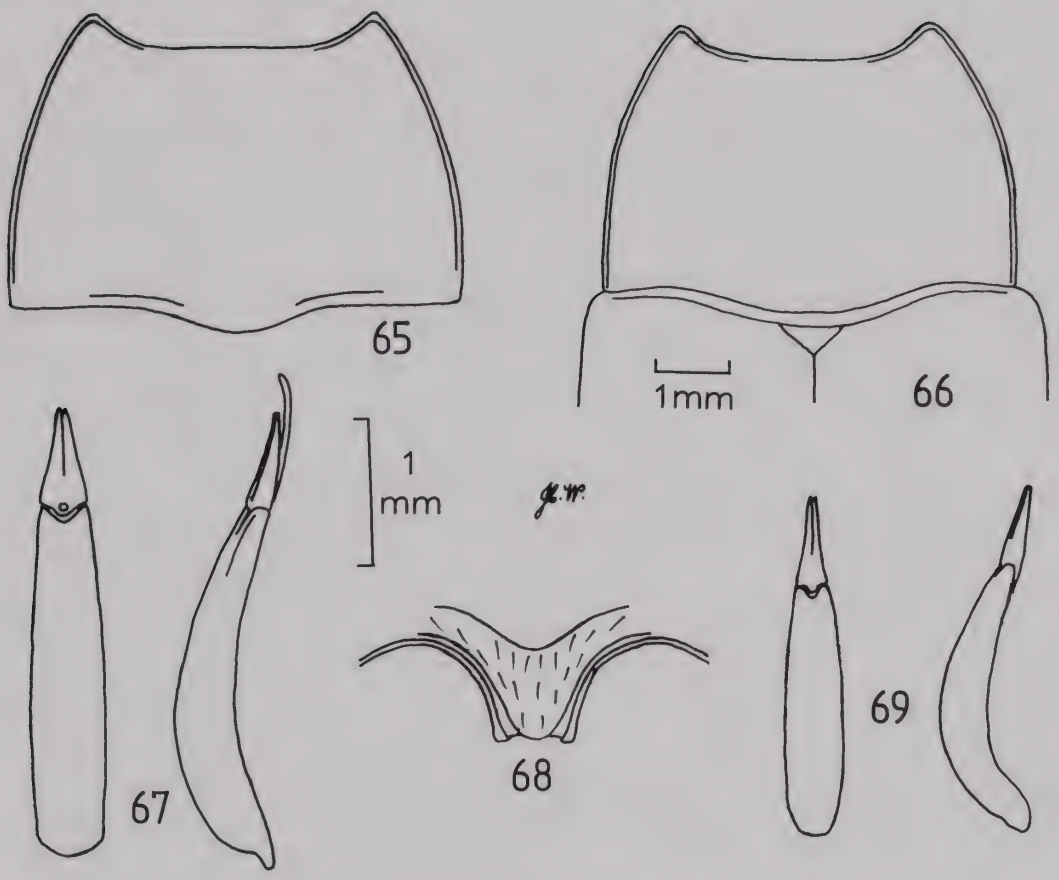
Related to *M. parvus* in many aspects, similar to *M. thoracicus* in others, and also showing certain resemblances to *M.elongatus*. Readily distinguished from *M. parvus* by its much stronger dorsal microsculpture, granulate elytra, and the structure of its aedeagus. Compared with *M. thoracicus* and *M. elongatus* below.

MALE

Oblong oval, convex, sides relatively parallel. Dorsal surface dull black, ventral surface shining black, legs dark reddish-black, antennae reddish.

Dorsal surface. Labrum and head relatively broader than in *M. thoracicus*, labrum more strongly emarginate. Dorsal surface of head closely, rather finely, and not deeply punctured, microsculpture just visible at 25 x magnification. Pronotum variable in shape, convex, submarginal channels obsolete; macropunctures small and shallow, separated mostly by more than twice their own diameter on disc, micropunctures just visible at 25 x magnification; microsculpture strong, clearly visible at 25 x magnification; granules absent, but small, smooth, shining areas which lack microsculpture are visible at 25 x magnification. Scutellum shining, macropunctures larger and deeper than in *M. thoracicus*. Elytra convex, form very similar to that of *M. elongatus* from the Cook Straight Islands, but shoulder more prominent, although not as prominent as in *M. thoracicus*, and base of elytra represented by distinct angular carinae, which are, however, not raised as they are in *M. thoracicus*. Submarginal channels narrow, approximately as in *M. elongatus* (Cook St populations), narrower than in *M. thoracicus*, inner angle obsolete as in *M. elongatus*. Punctation like that of *M. elongatus*, punctures relatively small; microsculpture strong, clearly visible at 25 x magnification; interstices of entire surface bearing granules visible at 25 x magnification.

Ventral surface. Postgenae, prosternum, procpisternum, depressed part of mesosternum, lateral parts of metasternum, metepisternum, lateral parts of first three abdominal sternites



Figs. 65-69. *Mimopeus* spp. Thorax and aedeagus. 65. *M. buchanani*, Pukerua Bay. Pronotum, male. 66. *M. lateralis*, Hanmer. Pronotum, male. 67. *M. buchanani*, Pukerua Bay. Aedeagus. 68. *M. buchanani*, Pukerua Bay. Mesosternal intercoxal process, male. 69. *M. lateralis*, Hanmer. Aedeagus.

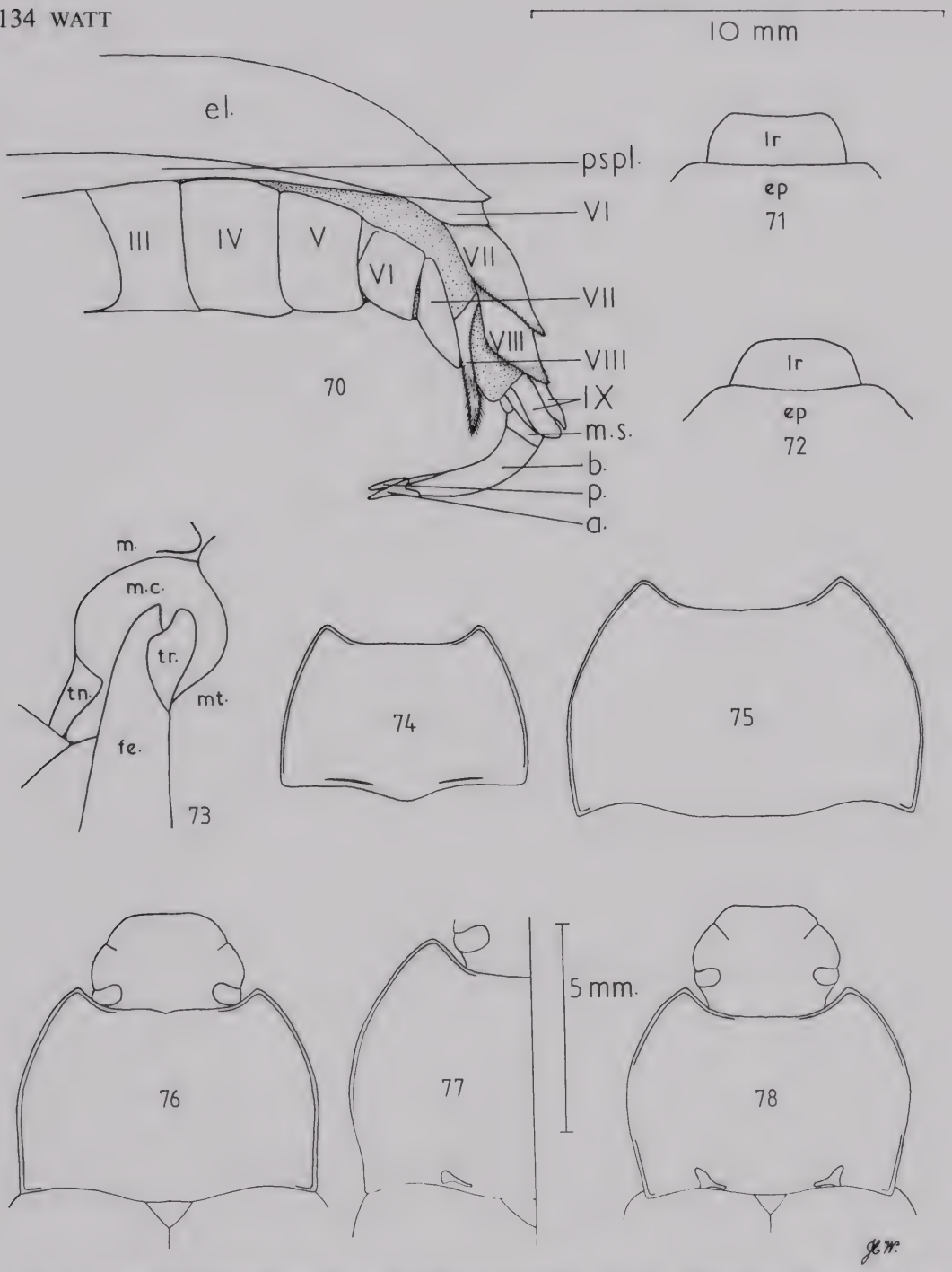
and epipleura all bearing granules clearly visible at 25 x magnification, particularly large on prosternum, mesosternum and postgenae. Posterior part of prosternal intercoxal process less prominent than in *M. thoracicus* or *M. elongatus*, other intercoxal processes approximately as in *M. thoracicus*. Punctation like that of *M. thoracicus*.

Legs. Approximately as in *M. thoracicus*.

Aedeagus (Fig.41).Much larger than in *M. thoracicus* but of the same basic type, not showing the short or very short apicale and stout basale of *M. elongatus*. In dorsal view apicale relatively stouter and basale relatively more slender than in *M. thoracicus*. In lateral view all parts relatively stouter than in M. thoracicus.

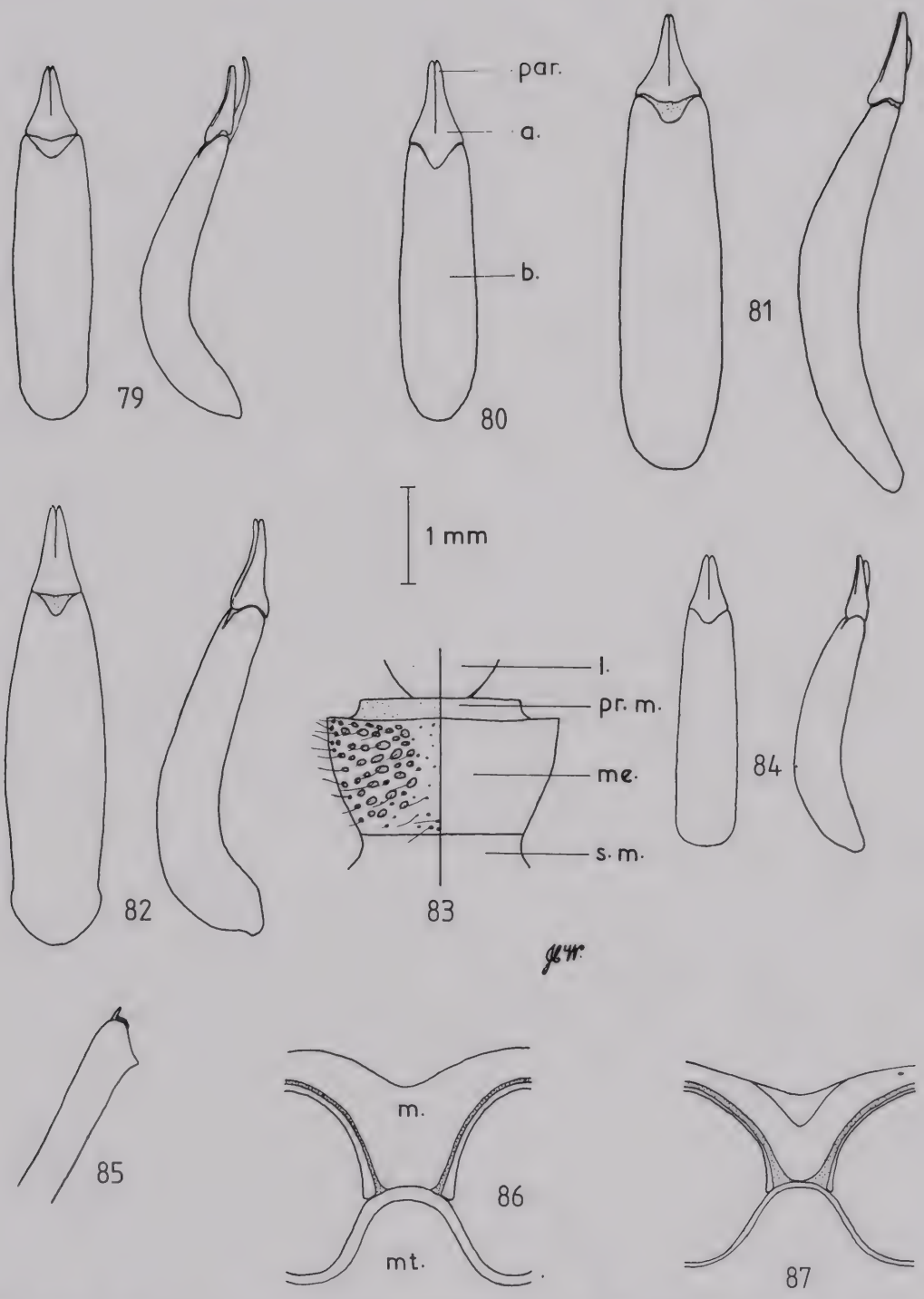
FEMALE

Like male, but slightly broader and more convex, legs relatively shorter, average size larger.



Figs. 70-78. *Mimopeus* spp. Head, thorax and abdomen. 70. *M. opaculus*, Cook Strait form, Stephens I. Lateral view of abdomen of male with aedeagus everted as in copulation. Roman numerals indicate segments of abdomen to which sclerites belong. 71. *M. opaculus*. Anterior view of labrum and front margin of clypeus. 72. *M. insularis*. Anterior view of labrum and front margin of clypeus. 73. *M. opaculus*. Ventro-lateral view of mesocoxa and associated structures. 74. *M. buchanani*, Pukerua Bay. Pronotum, male. 75. *M. opaculus*, Broken River. Pronotum, male. 76. *M. opaculus*, Albury. Head and pronotum, male. 77. *M. opaculus*, Mt Maungatua. Head and pronotum left side only. 78. *M. opaculus*, Owen I, S.E. Stewart Is. Head and pronotum, male.

a. apicale of tegmen, b. basale of tegmen, m.s. membranous sheath of aedeagus, el. elytron, p. penis (median lobe), p.s.p.l. epipleuron of elytron. e.p. front margin of clypeus, lr. labrum. fe. femur, m. mesosternum, m.c. mesocoxa, mt. metasternum, tn. trochantin, tr. trochanter.



Figs. 79-87. *Mimopeus* spp. Head, thorax and aedeagus. 79. *M. opaculus*, Canterbury form, Albury. Aedeagus, male. 80. *M. opaculus,* Owen I, S.E. Stewart Is. Aedeagus. 81. *M. opaculus,* Cook Str., Stephens I. Aedeagus. 82. *M. insularis,* Poor Knights. Aedeagus of holotype. 83. *M. opaculus,* Central North I, Gisborne. Mentum. 84. *M. impressifrons.* Aedeagus of lectotype. 85. *M. impressifrons,* Cromwell. Dorsal view of right front tibia, lectotype male. 86. *M. opaculus,* North I. 87. *M. opaculus,* South I. Mesosternal intercoxal process and anterior metasternal intercoxal process.

l.ligula, pr.m. premental membrane, me. mentum, s.m. submentum. m. mesosternal intercoxal process, mt. anterior metasternal intercoxal process.

DIMENSIONS

	Holotype ♂	*Allotype* ♀
Length	9.4 mm	10.0 mm
Width	4.8 mm	5.4 mm

Range (entire species). Length 8.7-13.0 mm, width 4.3-6.1 mm.

GEOGRAPHICAL VARIATION

The description is based on the long type series from Jordan, Awatere Valley. There is slight geographical variation in development of dorsal and ventral granules, which are rather smaller in specimens from Seddon to the north, and rather larger (ventrally only) in specimens from Upcot to the south. The apicale of Upcot individuals is more elongate.

TYPE MATERIAL. Holotype ♂. Jordan, Awatere Valley, under stone in river bank, 8 March 1961, J.C. Watt, NZAC. Allotype ♂ with same data as holotype, NZAC. Paratypes with same data as holotype, (4♂♂ 4♀♀) NZAC; (5♂♂ 5♀♀) NZAC; (♂ ♀) AMNZ (♂ ♀) BMNH; (♂ ♀) CMNZ (♂ ♀) NMNZ; (8 in alcohol) NZAC.

TYPE LOCALITY. Jordan, Awatere Valley, Marlborough.

Material examined. Holotype ♂, allotype ♀, 34 paratypes, 26 other specimens. Seddon, 26 Feb. 1916, H.H., (2) NMNZ. Durngree, under stones etc. 17 Nov. 1942, D. Spiller, (2) NMNZ. Camden, Awatere Valley, under stones, 9 March 1961, J.C.W., (10) NZAC. Limestone Creek (near Upcot), Awatere Valley, 20 February 1916, H.H., (2) NMNZ. Upcot, Awatere Valley, ca. 2,500 ft. [*ca* 762 m], under stones, 9 March 1961, J.C.W., (10) NZAC.

Distribution and ecology. Apparently confined to the lower and middle Awatere Valley, a dry valley just west of the inland Kaikoura Range, Marlborough. The types were collected under stones amongst sclerophyll scrub (*Discaria* etc.) on the banks of a small river near the old Jordan homestead. The remaining material collected by me was found under stones in little modified tussock grassland and sclerophyll scrub. None was found in sown pasture land.

Mimopeus clarkei sp.n. (Fig.53)

MALE

Smaller than typical *M. costellus*. Elytral costae less distinct. Sides of pronotum more strongly curved, pronotum more convex, punctures smaller, microsculpture of interstices weak, surface moderately shining. Elytral granules smaller, confined to lateral and hind slopes, costae only slightly raised. Shoulder less prominent, but narrowly rounded.

Mesosternal intercoxal process relatively broader, median part less convex. Punctation of prosternal intercoxal process less dense. Granules of epipleura of elytra small, barely visible at 25 x magnification.

Aedeagus smaller, base of basale more strongly curved downwards; otherwise identical with that of *M. costellus*.

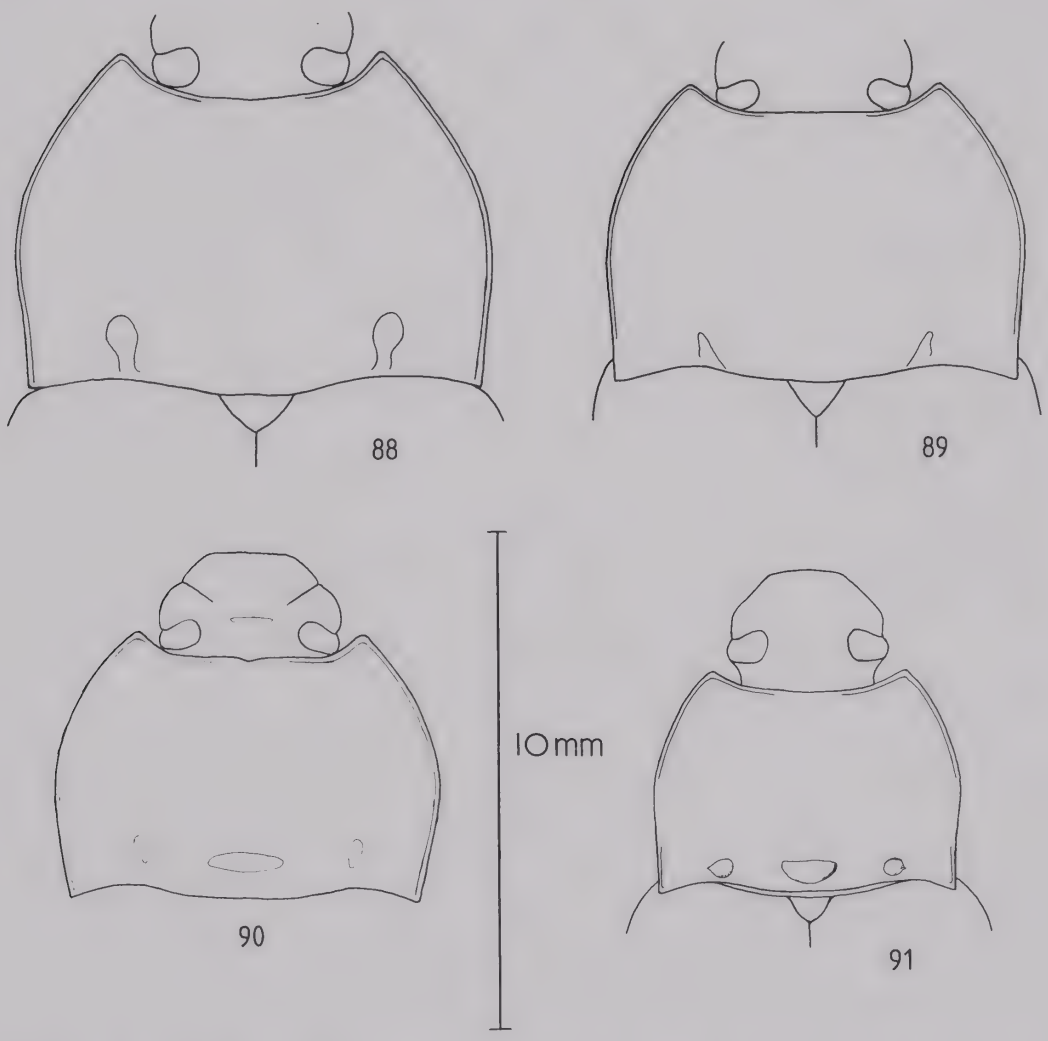
FEMALE

Like male, but legs relatively shorter and more slender.

DIMENSIONS

	Holotype ♂	*Allotype* ♀
Length	12.1 mm	12.2 mm
Width	6.3 mm	6.5 mm

Range. Length 10.6-16.8 mm, width 5.7-7.3 mm.



Figs. 88-91. *Mimopeus opaculus*. Head and pronotum. 88. *M. opaculus*, Cook Strait form, Stephens I. Male. 89. *M. opaculus*, Central North I form, Manawatu Gorge (lectotype of *M. smithianus*). 90. *M. opaculus*, Central North I form, Red Rocks, Wellington. Male. 91. *M. opaculus*, Central North I form, Waihirere near Gisborne. Male.

GEOGRAPHICAL VARIATION

The types were collected at Molesworth in the upper Awatere Valley. Four males from near Avondale in the Avon Valley, the next main valley to the west, are more convex than the Molesworth specimens, the pronotal sides are more strongly curved, the elytral granules are larger, and the aedeagus is slightly more slender, with more elongate apicale.

TYPE MATERIAL. Holotype ♂. Molesworth, Awatere Valley, 25.xii.45, C.E. Clarke, C.E.C./AMNZ. Allotype ♀ with same data as holotype, AMNZ. Paratypes, (3) AMNZ; (5) BMNH, all with same data as holotype.

TYPE LOCALITY. Molesworth, Awatere Valley, Marlborough.

Material examined. Holotype, allotype and 8 paratypes; 6 other specimens. Awatere Valley, October; Avon Valley near Avondale, August.

Distribution. Upper Awatere Valley and Avon Valley, Marlborough. Found under stones amongst dry scrub (*Discaria* etc.) and bracken (*Pteridium esculentum*) in the latter locality.

This species is named in honour of the late Mr C.E. Clarke, of Auckland, who collected most of the Coleoptera and Lepidoptera in the Auckland Museum. He spared no effort to collect in remote and inaccessible localities, and many interesting novelties, mainly undescribed, are to be found amongst his material.

Mimopeus parallelus sp.n. (Figs.39,46,55)

This species possesses some morphological features in common with *M. thoracicus*, rather fewer with *M. humeralis*, and a number quite peculiar to itself. It is readily distinguished from all other species of *Mimopeus* by the macrosculpture and highly polished interstices of the elytra and its more obviously parallel-sided form. Apart from the relationship to *M. thoracicus* and *M. humeralis*, it resembles *M. granulosus* in a number of respects, but is readily distinguished by its much smaller punctures, shining, non-granulate elytral interstices, curved apicale, less elongate basale and other characters.

MALE

Dark reddish brown to reddish black. Form oblong-oval, broad, convex, parallel-sided, less elongate than *M. humeralis*, sides straighter than in *M. thoracicus*.

Dorsal surface. Antennae as in *M. thoracicus*. Head similar to that of *M. thoracicus*, but labrum more strongly emarginate anteriorly; head broader and macropunctures larger and deeper than in *M. humeralis*. Pronotum convex, shape approximately as in *M. humeralis*, punctures rather larger and deeper than in *M. thoracicus* or *M. humeralis*; microsculpture strong, clearly visible at 25 x magnification. Scutellum shining, bearing scattered small, deep punctures. Elytra (Figs. 46,55) very convex, short, sides almost parallel, widest at about two thirds distance from base. Shoulder prominent, right-angled, narrowly rounded. Epipleural carinae run back from shoulder almost straight for about half the distance to apex, and then converge in a broad curve to apex. Submarginal channel broad and deeply defined from shoulder to beyond mid-length with epipleural carina reflexed vertically outside it for the same distance. Basal carina distinct, raised, extending from shoulder to base of first primary costa. Elytral punctures much larger and deeper than in *M. thoracicus* or *M. humeralis*,

running together to form irregular foveae between the costae, which are clearly visible, but rather rounded and irregular. Interstices between foveae (including costae) highly polished and lacking granules, although a few small granules are present in the heavily microsculptured submarginal channels.

Ventral surface. Head like that of *M. thoracicus*. Prosternum bearing laterally granules which are much larger than those of *M. thoracicus* or of *M. humeralis*. Proepisternum highly polished, bearing small granules. Median part of prosternal intercoxal process less prominent than in *M. humeralis*, similar to that of *M. thoracicus*. Mesosternal intercoxal process narrow, granules of depressed part of mesosternum larger than in *M. thoracicus* or *M. humeralis*. Metasternum and abdominal sternites approximately as in *M. humeralis*, but granules larger. Epipleura shining, bearing distinct granules.

Legs. Approximately as in *M. thoracicus*, punctures of front tibiae are larger and deeper than in *M. humeralis*.

Aedeagus (Fig.53). Rather similar to that of Kaikoura specimens of *M. thoracicus*, but in dorsal view tips of parameres diverging, sides of apicale noticeably sinuate, basale more slender; and in lateral view apicale curved distinctly downwards from base to apex. Stouter and less elongate than that of *M. humeralis*.

FEMALE

Usually slightly larger than male, legs relatively slightly shorter.

DIMENSIONS

	Holotype ♂	*Allotype* ♀
Length	10.4 mm	11.4 mm
Width	5.6 mm	5.8 mm

Range. Length 8.8-13.9 mm, width 4.8-6.2 mm.

TYPE MATERIAL. Holotype ♂. Glen Alton, Clarence Valley, under stone (on river bank), 10.iii.61, J.C. Watt, NZAC. Allotype ♀ with same data as holotype, NZAC. Paratypes with same data as holotype or collected on 21.viii.1962, (5♂ ♂ 5♀ ♀) NZAC; (2♂ ♂ 2♀ ♀) AMNZ; (2♂ ♂ 2♀ ♀) NMNZ; (2♂ ♂ 2♀ ♀) CMNZ; (2♂ ♂ 2♀ ♀) BMNH; (56) J.C.W. (chiefly in alcohol). Paratypes, Clarence River, 1.ii.1922, G Archey, (2♂ ♂ ♀) CMNZ; Clarence River, 21.i.30, under log, G.V. Hudson, (2♀ ♀) BMNH.

TYPE LOCALITY. Banks of George Creek, Lower Clarence Valley (near Clarence Bridge), Marlborough.

Material examined. Holotype ♂, allotype ♀, 87 paratypes, 7 other specimens. Clarence Bridge, 24.i.30, G.V. Hudson, (2) BMNH; (5) NMNZ.

Distribution and ecology. Known only from the lower Clarence Valley, where it occurs frequently, sometimes abundantly, under stones on river flats, usually around the bases of shrubs such as *Discaria* and a small-leaved *Coriaria*. The larvae are found under the same stones, but in the stony soil beneath, rather than directly beneath the stones.

Mimopeus johnsi sp.n. (Fig.95)

A distinctive species, most closely related to *M. costellus*. In some respects it resembles *M. tibialis*, but may be distinguished readily by the outer apical angle of the anterior tibia and the outer angle of the postgenal emargination, neither of which are dentate; by the broader and more clearly defined pronotal and elytral submarginal channels; and by other less obvious features.

MALE

Elongate oval, convex, black.

Dorsal surface. Dorsal punctures smaller than in *M. costellus*. Pronotum more convex, and sides more strongly curved than in *M. costellus;* submarginal channels present. Punctures of disc separated mostly by about 2 x their own diameter, interstices flat, microsculpture strong, clearly visible at 25 x magnification. Micropunctures distinct, deep to shallow, clearly visible at 25 x magnification. Elytra convex, elongate, sides subparallel basally. Flat submarginal channels extending from shoulder two thirds distance to apex, inner angle distinct; epipleural carina slightly reflexed. Shoulder narrowly rounded, but not prominent. Basal carina sharp, distinct, but barely or not raised. Elytral costae indistinct; granules absent except for a few small ones, which are scarcely visible at 25 x magnification, on submarginal channels. Punctation and microsculpture similar to that of pronotum. Setae of macropunctures clearly visible at 25 x magnification, especially on lateral slopes.

Ventral surface. Outer angle of maxillary emargination of postgenae slightly elevated, but bluntly rounded, not at all dentate. Granules of sterna and epipleura smaller than those of *M. costellus*, but granules of postgenae and proepisternaum larger. Intercoxal processes broader than in *M. costellus.* Punctures of ventral surface small to minute.

Legs. Femora finely punctured, smooth. Front tibiae very uneven below, and bearing small stout bristles. Middle and hind tibiae uneven and bearing similar bristles on lateral and ventral surfaces; other surfaces bearing finer and longer setae and less uneven, but deeply punctate.

Aedeagus (Fig.95). Rather similar to that of *M. costellus*, but apicale more elongate. Dorso-lateral surface of apicale forming a distinct longitudinal carina, below which is a longitudinal lateral groove extending from base towards apex, distinctly impressed for the first one third of the distance. Ventro-lateral angle distinctly carinate from base one quarter of distance to apex. These characters of the aedeagus appear to be unique in the genus.

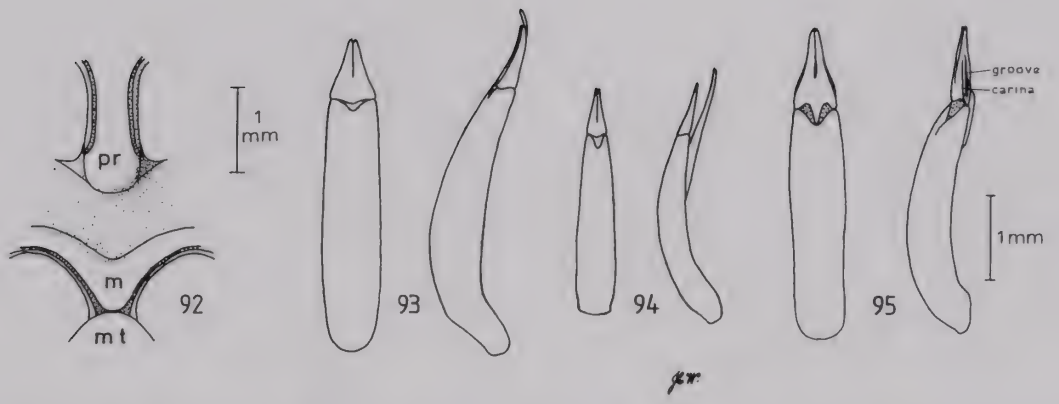
FEMALE

Not evidently distinguishable from male except by genitalia and terminal abdominal sclerites.

DIMENSIONS

	Holotype ♂	*Allotype* ♀	*Paratype* ♀
Length	13.8 mm	15.1 mm	14.1 mm
Width	6.9 mm	7.8 mm	7.2 mm

TYPE MATERIAL. Holotype ♂. Mt Percival, 3500-5200 ft.[*ca.*1067-1586m], near Hanmer, 30.x.62, P.M. Johns, CMNZ. Allotype ♀ with same data as holotype, CMNZ. Paratype ♀ with same data as holotype, NZAC.



Figs. 92-95. *Mimopeus* spp. Thorax and aedeagus. 92. *M. costellus*, typical form Loburn. Ventral view of part of thorax, male. 93. *M. costellus*, Loburn. Aedeagus. 94. *M. granulosus*, Dyers Pass. Aedeagus. 95. *M. johnsi*. Aedeagus of holotype.

TYPE LOCALITY. Mt Percival, near Hanmer, northern Canterbury.

Material examined. Holotype ♂, allotype ♀, paratype ♀.

Distribution. Known only from the type locality.

The species is named in honour of Mr P.M. Johns, who has greatly increased our knowledge of the Canterbury species of *Mimopeus* by his assiduous collecting.

Mimopeus convexus sp.n. (Figs.96,103)

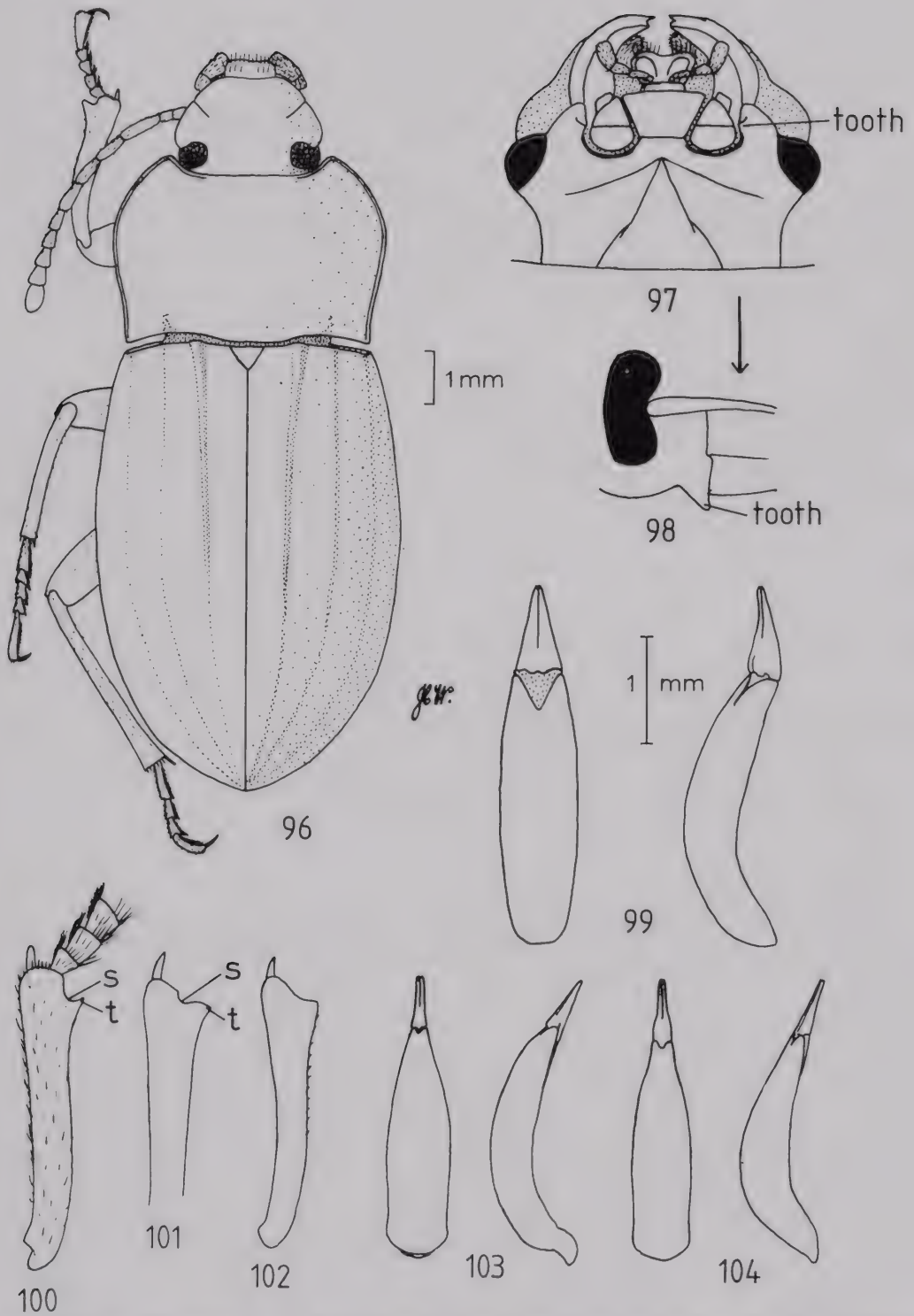
Most closely related to *M. rugosus*. Superficially similar to *M. tibialis*, but readily distinguished by the structure of the aedeagus; and the rounded, non-dentate lateral projection of the emargination of postgenae at base of cardo.

MALE

Elongate oval, convex (Fig.96). Dorsal surface and legs reddish black, slightly shining, antennae reddish, ventral surface shining black.

Dorsal surface. Labrum barely emarginate anteriorly, finely punctate, bearing numerous fairly stout setae. Punctures of dorsal surface of head smaller and shallower than in *M. rugosus* interstices flat, surface shining, microsculpture weak; micropunctures small and shallow, just visible at 25 x magnification. Pronotum more convex and more transverse than in *M. rugosus*, sides more strongly curved. Punctures smaller and shallower than in *M. rugosus*, macropunctures of disc separated mostly by more than their own diameter; micropunctures small and shallow, interstices flat. Surface shining, microsculpture not visible at 25 x magnification. Scutellum bearing small, deep punctures.

Elytra convex, more elongate than in *M. rugosus*. Costae obsolete, indicated only by slight elevations. Basal elytral carina distinct, but only slightly raised shoulder narrowly rounded; submarginal channel obsolete. Punctures much smaller and shallower than those of *M. rugosus* interstices only slightly uneven, microsculpture not strong, scarcely visible at 25 x magnification.



Figs. 96-104. *Mimopeus* spp. Whole insect, head, legs and aedeagus. 96. *M. convexus*. Holotype male. 97. *M. tibialis*. Ventral surface of head showing tooth (t) at outer angle of maxillary emargination. 98. *M. tibialis*. Lateral view of head showing tooth (t) etc. 99. *M. tibialis*, Christchurch. Aedeagus of lectotype. 100. *M. tibialis*. Dorsal view of anterior right tibia of lectotype. 101. *M. rugosus*, Upper Wedderburn. Dorsal view of anterior right tibia, male. 102. *M. granulosus*, Dyers Pass, Christchurch. Dorsal view of anterior right tibia, male. 103. *M. convexus*, Mt Hay, Tekapo. Aedeagus of holotype. 104. *M. rugosus*, Hyde. Aedeagus. s, sinus, t, tooth.

Ventral surface. Punctures of ventral sclerites much smaller and shallower than those of *M. rugosus*, setae much finer. Intercoxal processes as in *M. rugosus* except prosternal, which is less prominent posteriorly. Granules absent except on epipleura.

Legs. Punctures of legs smaller and shallower and hairs finer than in *M. rugosus*. Outer angle of anterior tibia as in *M. rugosus*, but "sinus" beside it deeper.

Aedeagus (Fig.103). Like that of *M. rugosus* except that apicale and apex of basale are even more slender in dorsal view.

FEMALE

Distinctly broader and more convex than male, legs shorter and more slender.

DIMENSIONS

	Holotype ♂	*Paratypes* ♂, L. Tekapo					Black Forest	
Length	11.9mm	11.0mm	11.7mm	11.5mm	11.2mm	11.7mm	12.2mm	11.8mm	11.8mm
Width	5.8mm	5.5mm	5.8mm	5.6mm	5.6mm	5.8mm	5.9mm	5.7mm	5.7mm

	Allotype ♀	*Paratypes* ♀, L. Tekapo				Pukaki	Black Forest	
Length	12.0mm	12.2mm	12.4mm	12.7mm	12.1mm	14.4mm	12.4mm	12.8mm	13.1mm
Width	6.0mm	6.2mm	6.4mm	6.6mm	6.5mm	7.6mm	6.2mm	6.4mm	6.6mm

Range.	Length	♂ 11.0-12.2mm	♀ 12.0-14.4mm
	Width	♂ 5.5- 5.9mm	♀ 6.0- 7.6mm

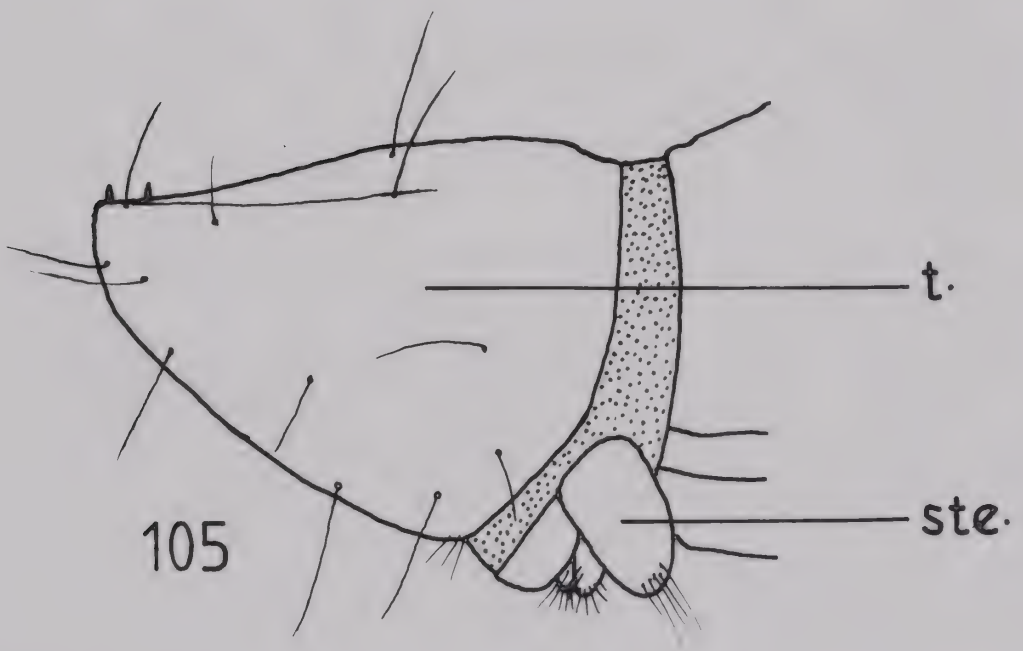


Fig. 105. *Mimopeus elongatus.* Final instar larva. Lateral view of terminal abdominal segment, anterior on right.
t. tergite, ste. sternite.

TYPE MATERIAL. Holotype ♂. Mt Hay, Tekapo, 2600 ft.[*ca.* 7930m], scree, 7.xii.62, P.M. Johns, CMNZ. Allotype ♀. Lake Tekapo, army camp area, xi.1957, P.S. Evans, CMNZ. Paratypes with same data as allotype, (♂ ♀) CMNZ. Mt John, S.W.L. Tekapo, rocky outcrop near trig, 24.ix.60, M. Williams, (♂) NZAC; (♂) BMNH; (♂) J.C.W. Mt Hay Station, E. Shore L. Tekapo, under stones, 24.xi.60, M. Williams, (♀) BMNH; (♀) J.C.W. Mt John, Tekapo, 3-3500 ft.[*ca.* 915-1067m], scree, 7.xii.62, P.M. Johns, (♂) NZAC. Lake Tekapo, under rocks, army camp, 25.xi.56, P.M. Johns, (♀) NMNZ. Lake Pukaki, 15.xi.55, B.B. Given (♀) NZAC. Black Forest Creek near Benmore Pass, scree, 1900 ft.[*ca.* 579m], 6.xii.62, P.M. Johns, (♂ ♀) CMNZ; (♂) NMNZ; (♂ ♀) AMNZ. Black Forest, Benmore Pass scree, 2,800 ft.[*ca.* 854m], P.M. Johns, (♀) NZAC.

TYPE LOCALITY. Vicinity of Lake Tekapo, southwest Canterbury.

Material examined. Holotype, allotype and 16 paratypes.

Distribution. Apparently confined to the MacKenzie Basin, Canterbury, where they are found under stones.

Acknowledgements. A massive stroke during 1985 while on study leave in Paris left me severely handicapped. My father Dr J.S. Watt assisted me to return to New Zealand and has tirelessly transported me to and from Entomology Division, DSIR, Mt Albert. He has greatly assisted with the preparation of this manuscript for publication, indeed without his unstinting assistance it could never have appeared in print.

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SAND-DUNE TIGER BEETLES OF NORTHERN NEW ZEALAND COASTS (COLEOPTERA: CICINDELIDAE)

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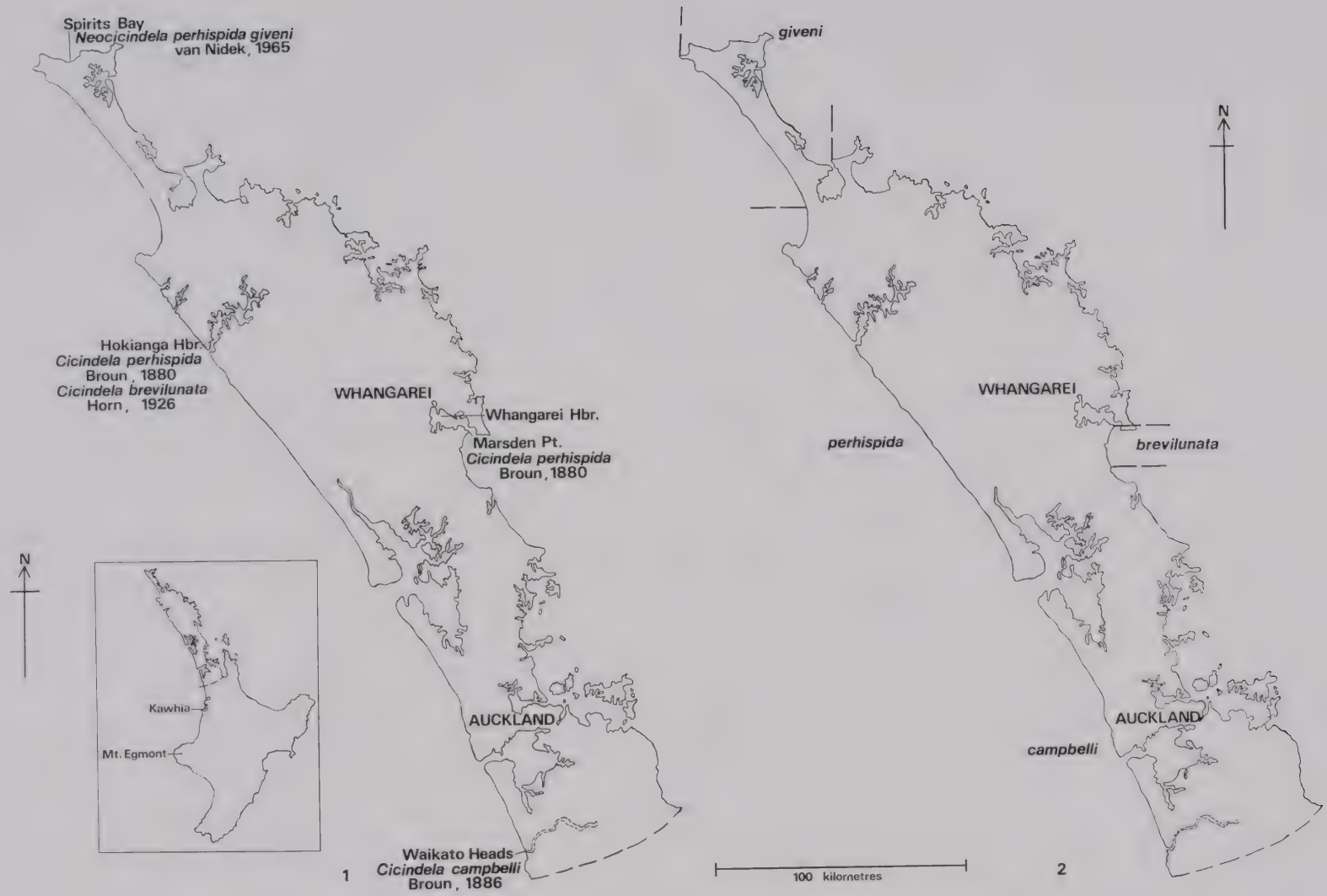
Abstract. This study of coastal tiger beetles was initiated to consider the occurrence of colour patterns on various sand colours. Historical records are included together with current collections around the northern coasts of the North Island.

Early records are confused but current collections show that, in the species currently accepted as *Neocicindela perhispida* (Broun, 1880), three previously described subspecies, *Neocicindela perhispida campbelli* (Broun, 1886) on black ironsands on the more southern west coast, *N.p. perhispida* (Broun, 1880) on grey to cream sands on the northern west coast and *N.p. giveni* van Nidek, 1965 on very pale cream and glistening white sands in the far north, are one continuous series with the *campbelli-perhispida* change zone along Muriwai Beach and the *perhispida-giveni* along Ninety Mile Beach further north. Another species *Neocicindela brevilunata* (Horn, 1926) is found to be confined to the east coast south of Whangarei Hbr., from Marsden Pt. south to Pakiri on greyish-white sand-dunes. Differences in sand colour and composition are shown to correspond with differences in the distribution of coastal tiger beetles. Local and seasonal activity of these beetles are noted, colour and elytral colour patterns are described and the consideration of species and subspecies is discussed.

Synonymic lists are provided for the two species together with details of specimens of the coastal tiger beetles in some overseas museums. The published records are compared. The results of these findings are discussed and compared with original descriptions of the two species elytral patterns which are shown to be two descriptions of the same species.

Coastal sand-dune tiger beetles have been known in the northern half of the North Island of New Zealand (Fig. 1) since T. Broun (1880) described *Cicindela perhispida* which he recorded from Hokianga and Marsden Point. Broun (1886) also described *Cicindela campbelli* from the Waikato Heads. A third species, *Cicindela brevilunata* was described by W. Horn (1926b) who recorded one specimen from Hokianga. Later, E. Rivalier (1963) described a new genus, *Neocicindela*, for all New Zealand species of Cicindelidae and, subsequently, C.M.C.B. van Nidek (1965) described *Neocicindela perhispida giveni* as a new subspecies from Spirits Bay. The distribution of these original localities are shown on the accompanying map (Fig. 1).

The present study originated when the author became aware from his own collecting (in the 1960s and 1970s) that the various elytral colours and patterns of the



Figs. 1,2. Maps. 1. Northern North I showing original localities recorded for described species and subspecies of coastal tiger beetles. Inset. North I, New Zealand. 2. Actual distribution of described species and subspecies of coastal tiger beetles from specimens collected for Auckland Museum, 1967-1980.

coastal sand-dune tiger beetles were related to the colours of the sands in different areas.

In general (see Figs. 2, 3-10), dark specimens similar to those described as *Cicindela campbelli* Broun, 1886, occurred on the black ironsands of the west coast beaches near Auckland and further south. The species accepted as *Cicindela perhispida* Broun, 1880, with reduced thin dark areas on the elytra, was from further north on the west coast cream sands and the subspecies *Neocicindela perhispida giveni* van Nidek, 1965, with dark areas almost completely reduced was on pale sands of the northernmost and eastern beaches of the far north. *Cicindela brevilunata* Horn, 1926, with bold but reduced dark areas, occurred on whitish sands south of the Whangarei Harbour on the east coast. Pinkish-brown sand on the intervening north-eastern coasts did not provide tiger beetles.

Further, because of apparent mis-labelling and/or mis-recording, there had been a confusion of the species names and localities in earlier years in regard to the *perhispida* of Broun (1880) occurring at Hokianga (on the west coast) and Marsden Point (south of Whangarei Harbour on the east coast) and to *brevilunata* of Horn (1926b) also occurring at Hokianga. Both Hudson (1935) and Horn (1936) had continued this confusion. Because neither Broun (1880) nor Horn (1926b) designated type specimens in their papers and because Horn (1936) recorded having a Hokianga specimen taken from Broun's collection in the British Museum there was a distinct possibility that the names of the two species could be exchanged. Consequently it was deemed necessary by the author to consider the taxonomic position of these two species which would require examination of types and other specimens in overseas museums. Subsequently this was done in 1987. Further collecting started in January 1988, during the 1987-88 summer season, has revealed further distributional and seasonal information for the entities concerned. The results of these studies are reported here.

HISTORICAL RECORDS

Biographical notes

This list starts with Capt. Thomas Broun who studied New Zealand beetles for at least 45 years and published extensively. Two people who follow (Cheeseman and Campbell) are credited by Broun with collecting early specimens he described. The next four persons were later Broun contemporaries who also collected coastal tiger beetles and the last three were later collectors.

Thomas Broun (1838-1919) was a professional soldier when he first arrived in New Zealand. Later he was both an amateur coleopterist and professional entomologist as well as a farmer and a schoolteacher. His first published paper on New Zealand Coleoptera was read before the Auckland Institute in May 1875, and many more followed.

Broun apparently started teaching (at Tairua, east of Auckland) in 1876 (Cheeseman 1920) and he moved to the Whangarei Heads area (on the northern side of Whangarei Hbr.) in 1877 (Broun MS. letters in Auckland Museum library). As the printing of his Manual (Broun 1880) had been authorised in 1877 (Hector 1880), he

Figs. 3-6. *Neocicindela* spp. Male. 3. *N. perhispida "campbelli"*. Waikato R. Heads. 4.IV.1988. 4. *N.perhispida "perhispida"*. Mitimiti, N. of Hokianga Hbr. Heads. 4.II.1988. 5. *N. perhispida "giveni"*. Kapowairua, Spirits Bay. 23.II.1988. 6. *N. brevilunata*. Marsden Pt. 26.II.1988.

Figs. 7-10. *Neocicindela* spp. Female. 7. *N. perhispida "campbelli".* Waikato R. Heads. 4.IV.1988. 8. *N. perhispida "perhispida".* Mitimiti, N. of Hokianga Hbr. Heads. 4.II.1988. 9. *N. perhispida "giveni".* Kapowairua, Spirits Bay. 23.II.1988. 10. *N. brevilunata.* Marsden Pt. 26.II.1988.

was actively engaged on species descriptions there. He moved to Kawau Island early in 1879 and completed his manuscript there (Broun MS. letters). The main Broun Collection of New Zealand Coleoptera is in British Museum (Natural History) Entomology, London, with a smaller duplicate collection in Entomology Division, D.S.I.R., Auckland.

T.F. Cheeseman, credited by Broun (1880) with the collection of a Hokianga (west coast) specimen, was principally a botanist. He was appointed Curator of the Auckland Museum in 1874. His original notebooks in the library of this museum have been searched but no indication that he visited the west coast Hokianga area prior to 1880 has been found although he collected in the Whangarei area several times. There are also no plant collections by Cheeseman from Hokianga or that area of coast in the Cheeseman Herbarium. Cheeseman (1920) later wrote an obituary for Thomas Broun in which he mentioned first meeting Broun in 1875.

A certain W.D. Campbell Assoc.Inst.C.E. published several papers on beaches, zoology and geology in the *Transactions of the New Zealand Institute* between 1877 and 1883. The last three were read to the Auckland Institute in 1881 and 1882 so he could well have been the collector of the Waikato Heads specimens of *Cicindela campbelli* Broun, 1886. Campbell may have had direct contact with Broun or indirect through Cheeseman.

Later contemporaries were A.E. Brookes (1876-1955) an amateur conchologist and coleopterist of Auckland (in later life) and E.R. Fairburn (1890-1982) an amateur coleopterist of Whangarei. The Brookes Collection is now in Entomology Division, D.S.I.R., Auckland and the Fairburn Collection is now in the Northland Regional Museum, Whangarei. Brookes and Fairburn both collected tiger beetles at Ruakaka beach on 25 March 1932.

C.E. Clarke, another contemporary amateur entomologist lived at Dunedin in the South Island before he moved to Auckland in the 1920s. After presenting his general collection, including Coleoptera, to the Auckland Museum in 1929, he built up a second Coleoptera collection which was divided between Auckland Museum and British Museum (National History) in the 1950s.

A further contemporary was Arthur Richardson (1881-1963), a general collector of South Auckland, who collected insects occasionally and exchanged specimens with the others. His private museum including insects was sold privately but all his coastal tiger beetle specimens are in other collectiions. He collected on Ninety Mile Beach with C.E. Clarke on 11 January 1927.

E.D. Pritchard, of Auckland, who is not so well-known amongst New Zealand amateur entomologists, has collected (mainly beetles and springtails) in the North Island since 1938. His collections, now in the Auckland Museum, include several series of coastal tiger beetles from the northern North I.

B.B. Given (now retired) and the late R.A. Cumber were both professional entomologists (of Entomology Division, D.S.I.R.) who were together on a field trip to Spirits Bay when they collected coastal tiger beetles there in January 1957.

Collections and published records

In his *Manual of New Zealand Coleoptera*, Broun (1880) published a description of *Cicindela perhispida* as his species number "9". Broun stated that he was indebted to T.F. Cheeseman (then Botanist of the Auckland Museum) for a specimen which he found near Hokianga (which is on the northern west coast) and added "I found a few others on the loose white sand at Marsden Point, Whangarei Harbour" (which is on the northern east coast). This was the beginning of a confusion which has lasted ever since.

Another species, *Cicindela campbelli*, was described by Broun (1886) as his number "1451" from three "terribly mutilated" specimens "caught at Waikato Heads" (which is on the west coast south of Auckland) by W.D. Campbell.

W. Horn (1892) described a variety of *Cicindela perhispida* Broun (without naming it), from a specimen in the Vienna Museum collections. In his catalogue of Cicindelidae, E. Fleutiaux (1892) listed the New Zealand species of *Cicindela* including *perhispida* Broun and *campbelli* Broun.

W. Horn (1893) suggested that *Cicindela perhispida* and *C. campbelli* could be varieties of one species, and he named his 1892 variety of *perhispida* as var. *brouni*. However, Horn (1896), having seen Broun specimens of *C. campbelli* in the C.A. Dohrn collection, synonymised his variety *brouni* with that species.

J.J. Walker (1904) recorded *Cicindela perhispida* Broun from coastal sand-dunes west of "Woodhills", on the west coast north of Auckland. This is Woodhill, south of the Kaipara Harbour. Some 5.6-6.4 km distant to the west is Muriwai Beach, at ca. 8.5 - 10.7 km north of Muriwai, which Walker reached. F.W. Hutton (1904) listed *Cicindela perhispida* Broun and *C. campbelli* Broun in his *Index Faunae Novae Zealandiae*, as did G.V. Hudson (1923).

In the *Genera Insectorum*, W. Horn (1915) included the New Zealand species of Cicindelidae recording *Cicindela perhispida* Broun, 1880 and *C. campbelli* Broun, 1886 with Horn's own previous records of *perhispida* var. (1892) and var. *brouni* (1893, 1896) as synonyms of *campbelli*. There is also a figure, on a colour plate, named *Cicindela perhispida* but which clearly has the colour pattern of his later-named species *C. brevilunata* Horn, 1926. In the *Coleopterorum Catalogus*, W. Horn (1926a) listed *Cicindela campbelli* Broun, 1980, with the same synonymy, and *C. perhispida* Broun, 1880.

W. Horn (1926b) also described *Cicindela brevilunata*, with his above-mentioned figure name of *Cicindela perhispida* (Horn 1915) as a synonym. Unfortunately, two of the three recorded specimens were without locality and the third was a specimen, previously in the British Museum collection, labelled "Hokianga". This area is on the northern west coast while the form described and figured (Horn 1915) is the east coast form.

In his book on New Zealand Coleoptera, G.V. Hudson (1934) gave a description of the *Cicindela perhispida* elytral markings and previous locality records. The systematic index included *C. perhispida* Broun and *C. campbelli* Broun.

W. Horn (1936) again recorded the three known northern coastal forms of *Cicindela* but placed *campbelli* as a subspecies of *perhispida*. He gave additional locality records, repeated the Hokianga-Marsden Point confusion, and mentioned the Hokianga specimen of *C. brevilunata* (Horn 1926b) now in his collection from the Broun collection in the British Museum.

In a note under the heading of *Cicindela brevilunata*, A.E. Brookes (1944) pointed out that this species is an east coast species and that *C. perhispida* is a west coast species. He queried the earlier confusion of localities, particularly a statement by Horn (1936), and made other comments.

E. Rivalier (1963, 1964) described a new genus *Neocicindela* for all New Zealand species. Subsequently, C.M.C. Brouerius van Nidek (1965) listed the species of *Neocicindela* Rivalier, 1963 and included *N. brevilunata* and *N.perhispida*. For the latter, he recognised the subspecies *perhispida perhispida* and *perhispida campbelli*, and described a third subspecies *perhispida giveni* from Spirits Bay (which is on the far northern coast of Northland).

In a catalogue of types held in the former Deutsches Entomologisches Institut, H. Döbler (1973) listed "*brevilunata* Horn, 1926 (*Cicindela*)" with the three syntypes recorded by Horn (1926b) and the two of these in the DEI collection. Also listed was "*brouni* Horn, 1893 (*Cicindela*)" (a variety of *perhispida* synonymised with *campbelli* by Horn 1896) with one syntype in the DEI collection. The Deutsches Entomologisches Institut of Berlin was moved to Eberswalde in 1964 and was re-named as the Abteilung Taxonomie der Insekten of the Institut für Pflanzenschultzforschung, Eberswalde, D.D.R. (East Germany), in 1970.

RECENT COLLECTIONS, SAND-DUNES AND SAND

Coastal sand-dune collections

Localities collected by the author since the 1960s (see Fig. 11) are listed in order from south to north up the west coast and southwards down the east coast in Table 1. Specimen elytral marks (see Figs. 12-51) and colours are compared with visible sand colours and composition. Colours given are comparative, there is a range of intervening shades. There is also a wide range of variation in the elytral dark marks and colour pattern, particularly through the west coast to far north series (the *campbelli-perhispida-giveni* patterns).

No secondary sexual characters have been noticed. Elytral colour patterns of males and females appear to fall within the overall range of variation. Larger individuals (often females) may give the impression of thicker dark marks but this is a matter of size. The key comparison is between the dark marks and the pale colour markings on each specimen. The thicker and thinner dark marks recorded here are visible on individuals of both sexes and all sizes.

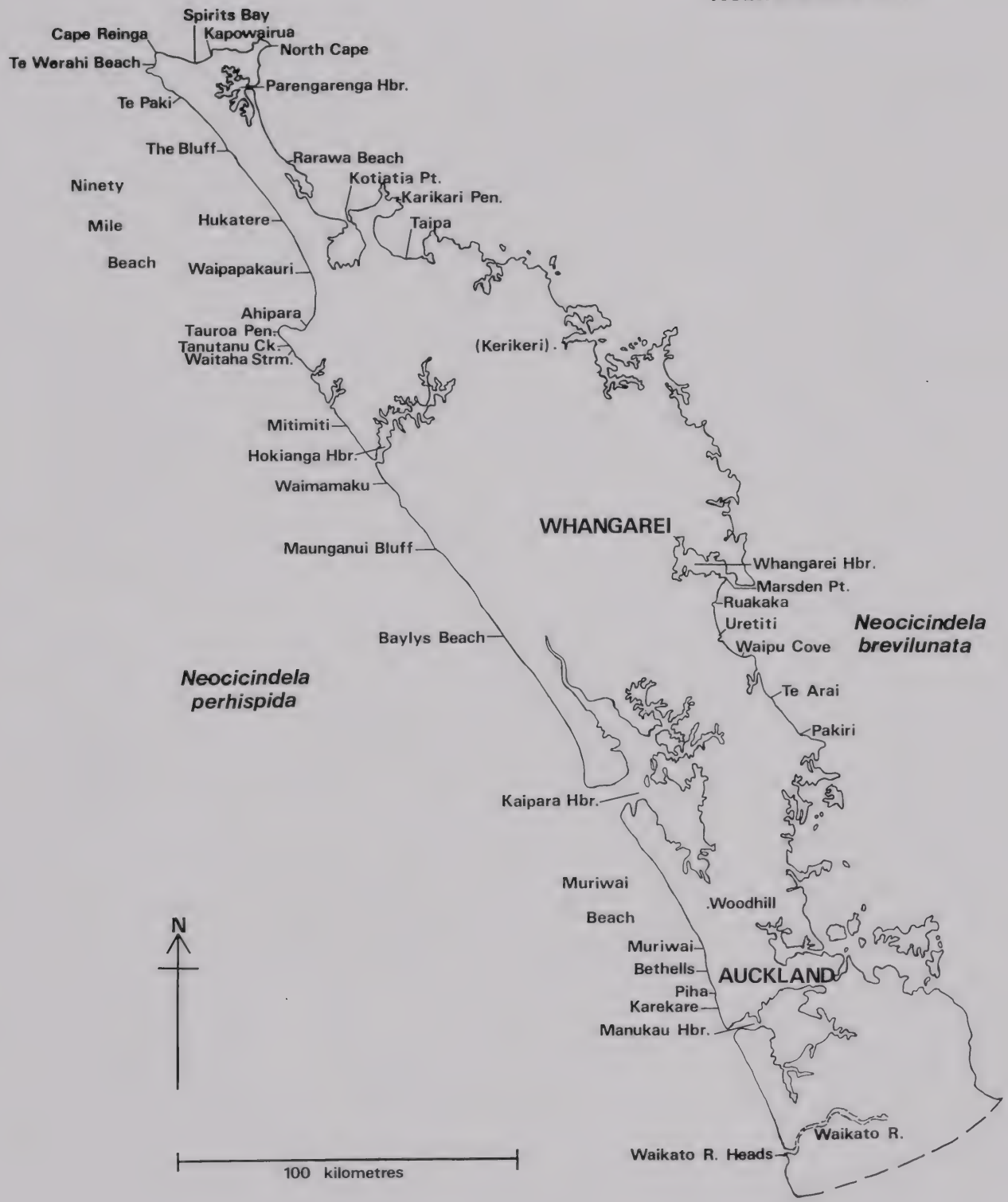


Fig. 11. Map. Northern North I. Localities for the two coastal tiger beetle species *Neocicindela perhispida* (Broun, 1880) and *N. brevilunata* (Horn, 1926), with other mentioned features. See also Fig. 1 inset.

Table 1. Elytral markings and colour of coastal tiger beetles, *Neocicindela perhispida* (Broun, 1880) and *N. brevilunata* (Horn, 1926), in collections from the northern North I, with sand colours.

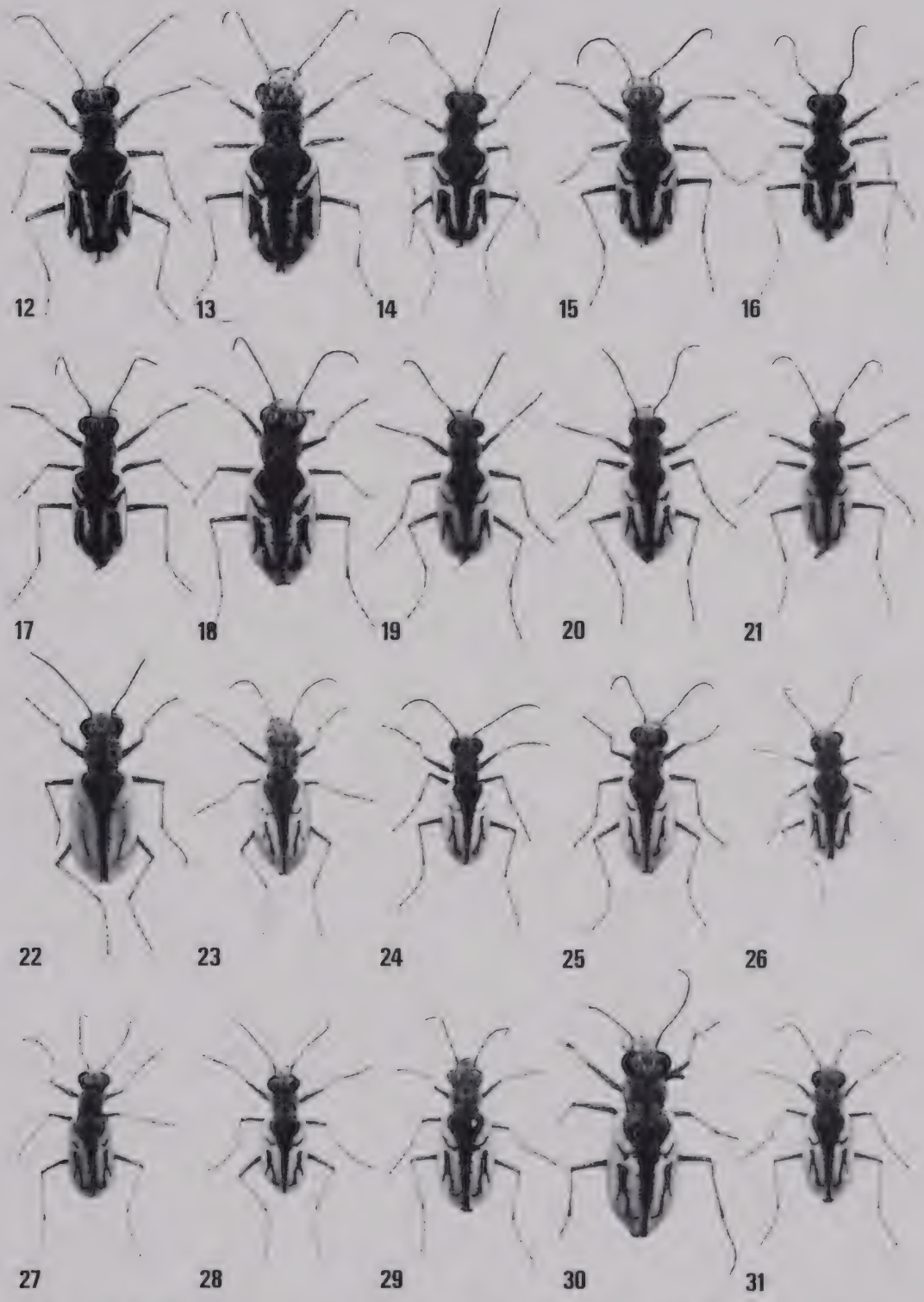
Locality	Date & No. of specimens	Specimen elytral markings		Sand samples
		Dark background marks	Colour	
N. perhispida (Broun, 1880)				
Beach W. of Kawhia	18.III.1982 -3	Thick with thick lateral edges	Yellowish	Dark ironsands
Beach S. side Waikato R. Heads	4.IV.1988 -10	Thick	Dark cream	Dark ironsands
Beach Karekare	1.II.1988 -4	Thick, 1 with thick lateral edges	Dark cream	Dark ironsands
Beach Bethells	1.IV.1969 -9	Thick	Dark cream	Dark ironsands
S. end Muriwai Beach, Muriwai	25.I.1988 -4	Thick, 2 part thin	Dark cream	Dark ironsands
Muriwai Beach, 2.1km N. of Muriwai	5.IV.1988 -1	Thinner	Cream	Dark ironsands
Muriwai Beach, 3.6km N. of Muriwai	31.III.1988- 1	Thick	Cream	
Muriwai Beach, 4.7km N. of Muriwai	31.III.1988 -1	Thick	Cream	Dark ironsands
Muriwai Beach, 6.2km N. of Muriwai	31.III.1988 -2	Thick	Cream	Dark ironsands
Muriwai Beach, 7.6km N. of Muriwai	31.III.1982 -2	Thick	Cream	Dark ironsands
Muriwai Beach, 9.1km N. of Muriwai	5.IV.1988 -1	Thinner	Cream	Dark ironsands
Muriwai Beach, 10.1km N. of Muriwai	5.IV.1988 -2	1 thick 1 thin	Cream	
Muriwai Beach, 11.4km N. of Muriwai	5.IV.1988 -8	3 thick 5 thin	Cream	Dark
Muriwai Beach, 12.3km N. of Muriwai	31.III.1988 -5	1 part thick 4 thin	Cream	Dark-dark grey
Muriwai Beach, 16.4km N. of Muriwai	31.III.1988 -2	Thin	Cream	Dark grey
Muriwai Beach, 19.3km N. of Muriwai	16.III.1988 -8	Thin	Cream	Dark grey
Beach S. of Chases Gorge, Baylys Beach	31.I.1973 -5	Thin		Dark cream
	13.IV.1988 -1	Thin	Cream	Dark cream
Aranga Beach, S. of Maunganui Bluff	11.III.1976 -5	Thin	Cream	Dark cream
Beach Waimamaku, S. of Hokianga Hbr.	5.II.1988 -17	10 thin 7 thin, reduced	1 dark cream 16 cream-pale whitish cream	Cream, whitish cream (coarse)
Beach S. end Mitimiti, N. of Hokianga Hbr.	4.II.1988 -12	9 very thin 3 very thin, reduced	1 dark cream 11 cream-pale cream	(Pale cream)

Beach N. end Mitimiti, N. of Hokianga Hbr.	4.II.1988	-8	6 very thin 2 very thin, reduced	1 Dark cream 7 Cream-pale cream	Pale cream
Beach at Waitaha Strm, S. of Tauroa Pen.	9.II.1988	-27	6 very thin 21 reduced	Cream-very pale cream (some discoloured)	Pale cream
Beach at Tanutanu Ck., S. of Tauroa Pen.	16.II.1983	-2	Very thin, part reduced	Pale cream	Pale cream
	13.XII.1985	-1	Very thin, part reduced		
Ninety Mile Beach, Ahipara	1.II.1973	-5	Thin	Cream	Dark cream
	13.I.1988	-4	3 thin 1 thin, part reduced	3 cream, 1 dark cream	
	8.II.1988	-8	Thin	7 cream, 1 dark cream	Dark cream
	26.III.1988	-1	Thin	Cream	Dark cream
Ninety Mile Beach, Waipapakauri	7.III.1978	-1	Thin	Cream	
	27.II.1984	-4	Thin	Cream	Dark cream
	26.III.1988	-2	Thin	Cream	Dark cream
Ninety Mile Beach, Hukatere	14.I.1988	-9	Thin — very thin	Cream	Dark cream
	25.II.1988	-16	14 thin 2 thin, reduced	Cream	Dark Cream
On yellow sand in forest clearing ca. 3.6km from beach, Hukatere	25.III.1988	-1	Thin	Yellowish-cream	Yellow
Ninety Mile Beach, 4.2km N. of Hukatere	23.III.1988	-6	1 thin 5 very thin	Pale cream	Dark cream
Ninety Mile Beach, 8.7km N. of Hukatere	24.III.1988	-3	1 thin 2 very thin	Pale cream	Dark cream
Ninety Mile Beach, 15.0km N. of Hukatere	24.III.1988	-2	2 very thin	Cream	Dark cream
Ninety Mile Beach, 15.8km N. of Hukatere	25.III.1988	-3	Thin — very thin	Cream	Dark cream
Ninety Mile Beach, 17.2km N. of Hukatere	25.III.1988	-5	1 thin 3 very thin 1 very thin, part reduced	Pale cream	Dark cream
Ninety Mile Beach, 18.4km N. of Hukatere	25.III.1988	-2	1 very thin, 1 very thin, part reduced	Pale cream	Dark cream
Ninety Mile Beach, 19.8km N. of Hukatere	24.III.1988	-4	1 very thin 2 very thin, reduced 1 very thin, part reduced	Pale cream	Dark cream
Ninety Mile Beach, 20.5km N. of Hukatere	25.III.1988	-1	Very thin, reduced	Pale cream	Cream

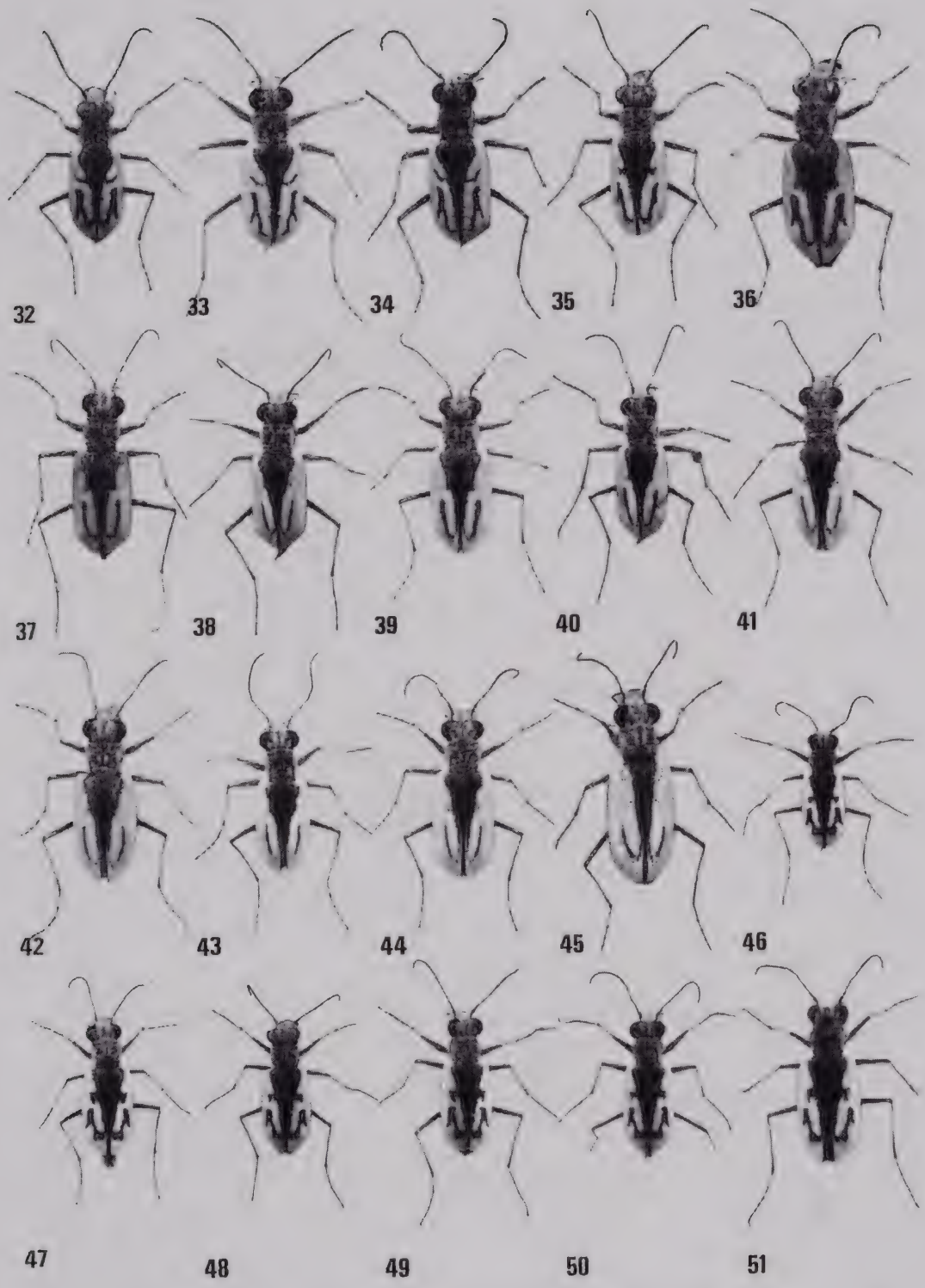
Table 1. Continued

Locality	Date & No. of specimens	Specimen elytral markings: Dark background marks	Colour	Sand samples
Ninety Mile Beach, 20.7km N. of Hukatere	24.III.1988 -2	Very thin, reduced	Pale cream	Cream
Ninety Mile Beach, 25.1km N. of Hukatere	24.III.1988 -2	Very thin, reduced	Pale cream	Cream
Ninety Mile Beach, S. of The Bluff, Te Kao	22.III.1988 -2	2 very thin, reduced	Pale cream	Cream
	23.III.1988 -6	1 very thin, reduced 5 very thin, very reduced		
Ninety Mile Beach, S. side The Bluff, Te Kao, 30.5km N. of Hukatere	25.II.1988 -3	2 very thin, reduced 1 very thin, very reduced	Pale cream-very pale cream	Cream
Ninety Mile Beach, 0.5km N. of The Bluff, Te Kao	22.III.1988 -3	1 very thin, reduced 2 very thin, very reduced	Very pale cream	Cream
Ninety Mile Beach, Te Paki	24.II.1988 -16	3 very thin, reduced 13 very thin, very reduced	Very pale cream	Cream
Te Werahi Beach, SW. of C. Reinga	23.II.1967 -1	Very thin, very reduced		
	24.II.1988 -25	6 very thin, reduced 19 very thin, very reduced	Cream-very pale cream	Pale cream
Top of sand cliffs Te Werahi Beach, SW of C. Reinga	24.II.1988 -4	Very thin, very reduced	Pale cream	Yellow
Beach Kapowairua, Spirits Bay	23.II.1988 -31	1 very thin, reduced 30 very thin, very reduced (Inc. 3 very faint)	Pale cream-very pale cream	Whitish cream quartz + shell
Rarawa Beach, Ngataki	9.III.1967 -18	3 very thin, reduced 14 very thin, reduced 1 nil	White	(White)
	2.II.1973 -7	6 very thin, very reduced 1 nil	White	White
	29.II.1984 -5	Very thin, very reduced (Incl. 2 very faint)	White	
	14.I.1988 -12	3 very thin, reduced 8 very thin, very reduced (Incl. 2 very faint) 1 nil	White	White quartz (fine)
	23.III.1988 -15	8 very thin, reduced 7 very thin, very reduced (Incl. 1 very faint)	White	White quartz (fine)

Rarawa Beach, Ngataki	19.V.1988	-4	2 very thin, reduced 2 very thin, very reduced (Incl. 1 very faint)	White	White quartz
On beach at edge of stream, Rarawa Beach, Ngataki	2.II.1973	-4	Very thin, very reduced	Discoloured	Dull white (discoloured
Beach N. of Kotiatia Pt N. of Rangiputa, Karikari Pen.	5.III.1976	-10	1 very thin, reduced 6 very thin, very reduced 3 nil	White	(White quartz)
	30.VI.1988	-0			White quartz
N. brevilunata (Horn, 1926)					
Beach Marsden Pt.	17.III.1968	-5	Thin	Dull white	Greyish-white
	26.II.1988	-37	Thin	Dull white	Greyish-white
Beach Ruakaka	3.II.1988	-6	Thin	Dull white	Greyish-white
	20.IV.1988	-6	Thin	Dull white	Greyish-white
Beach Uretiti, N. of Waipu R.	3.II.1973	-9	Thin	Dull white	Greyish-white
	2.I.1982	-7	Thin	Dull white	
	25.III.1982	-8	Thin	Dull white	Greyish-white
	12.I.1988	-5	Thin	Dull white	Greyish-white
	3.II.1988	-9	Thin	Dull white	
	20.III.1988	-13	Thin	Dull white	Greyish-white
	20.IV.1988	-6	Thin	Dull white	Greyish-white
	17.V.1988	-5	4 thin 1 very thin	Dull white	Greyish-white
	22.VII.1988	-1	Thin	Dull white	
Beach N. end Waipu Cove	19.IV.1988	-8	7 thin 1 very thin	Dull white	Greyish-white (coarse)
Beach Te Arai	19.IV.1988	-1	Thin	Dull white	Greyish-white (coarse)
Beach Pakiri	12.IV.1988	-11	6 thin 5 very thin	Dull white (Some discoloured)	Greyish-white (coarse)
	17.V.1988	-13	9 thin 4 very thin	Dull white (Some discoloured)	Greyish-white (coarse)
	22.VI.1988	-2	Thin	Dull white	Greyish-white (coarse)



Figs. 12-31. *Neocicindela* spp. *N. perhispida.* Waikato R. Heads — Hukatere. 12,13. S. side Waikato R. Heads. 4.IV.1988. 12. ♂. 13. ♀ 14. Karekare. 1.II.1988. ♀. 15-20. Muriwai Beach. 15. 2.1 km N. of Muriwai. 5.IV.1988. ♂. 16. 4.7 km N. of Muriwai. 31.III.1988. ♂. 17. 6.2 km N. of Muriwai. 31.III.1988. ♂. 18. 9.1 km N. of Muriwai. 5.IV.1988. ♀. 19. 12.3 km N. of Muriwai. 31.III.1988. ♂. 20. 19.3 km N. of Muriwai. 16.III.1988. ♂. 21. S. of Chases Gorge, Baylys Beach. 13.IV.1988. ♂. 22,23. Beach Waimamaku, S. of Hokianga Hbr. 5.II.1988. 22. ♀. 23. ♀. 24,25. Mitimiti, N. of Hokianga Hbr. 4.II.1988. 24. ♂. 25. ♀. 26-31. Ninety Mile Beach. 26. Ahipara. 8.II.1988. ♀. 27. Waipapakauri. 26.II.1988. ♂. 28,29. Hukatere. 25.II.1988. 28. ♂. 29. ♀. 30. Hukatere. ca. 3.6 km from beach. 25.III.1988. ♀. 31. 8.7 km N. of Hukatere. 24.III.1988. ♀.



Figs. 32-51. *Neocicindela* spp. 32-45. *N. perhispida*. Hukatere - Rarawa Beach. 32-41. Ninety Mile Beach. 32. 15.0 km N. of Hukatere. 24.III.1988. ♂. 33. 18.4 km N. of Hukatere. 25.III.1988. ♂. 34-36. 19.8 km N. of Hukatere. 24.III.1988. 34. ♂. 35. ♂. 36. ♀. 37. 20.7 km N. of Hukatere. 24.III.1988. ♂. 38. 25.1 km N. of Hukatere. 24.III.1988. ♂. 39. S. side The Bluff, 30.5 km N. of Hukatere. 25.II.1988. ♀. 40. 0.5 km N. of The Bluff. 22.III.1988. ♂. 41. Te Paki. 24.II.1988. ♂. 42. Te Werahi Beach. 24.II.1988. ♀. 43,44. Kapowairua, Spirits Bay. 23.II.1988. 43. ♂. 44. ♀. 45. Rarawa Beach. 23.III.1988. ♀. 46-51. *N. brevilunata*. Marsden Pt.-Pakiri. 46,47. Marsden Pt. 26.II.1988. 46. ♂. 47. ♀. 48. Ruakaka. 20.IV.1988. ♀. 49. Uretiti. 20.III.1988. ♂. 50. Beach Te Arai. 19.IV.1988 ♂. 51. Pakiri. 12.IV.1988. ♀.

North Island west coast beaches, as at Kawhia and Waikato River heads (Fig. 57), are black from the presence of ironsands which continue on several west coast beaches north of the Manukau Hbr. as far as the south end of Muriwai Beach. The dark *campbelli* colour pattern on tiger beetles occurs there but it is now seen that as the black sands thin out and become patchy northwards along this beach the tiger beetle black background marks become thinner and the creamy colour area becomes more extensive. The trip meter of a vehicle, driven northwards along the beach from the southern entrance, was used to measure the kilometres as far as 16.4 km. Another entrance was used at 19.3 km and specimens there were of the *perhispida* pattern. North of the Kaipara Hbr. the *perhispida* pattern is continued northwards on cream sands to Ninety Mile Beach except for the Waimamaku beach, south of Hokianga Hbr. There (Waimamaku), both cream and whitish cream sands occur and tiger beetle specimens show a range of reduction of the dark marks to the *giveni* pattern combined with a very pale colour. North of the Hokianga Hbr. a long beach of pale cream sand extends beyond Mitimiti (Fig. 56) where specimens have a very thin but complete *perhispida* pattern. Beaches further north on the same coast have varied sands and again there are reductions in the dark marks on specimens.

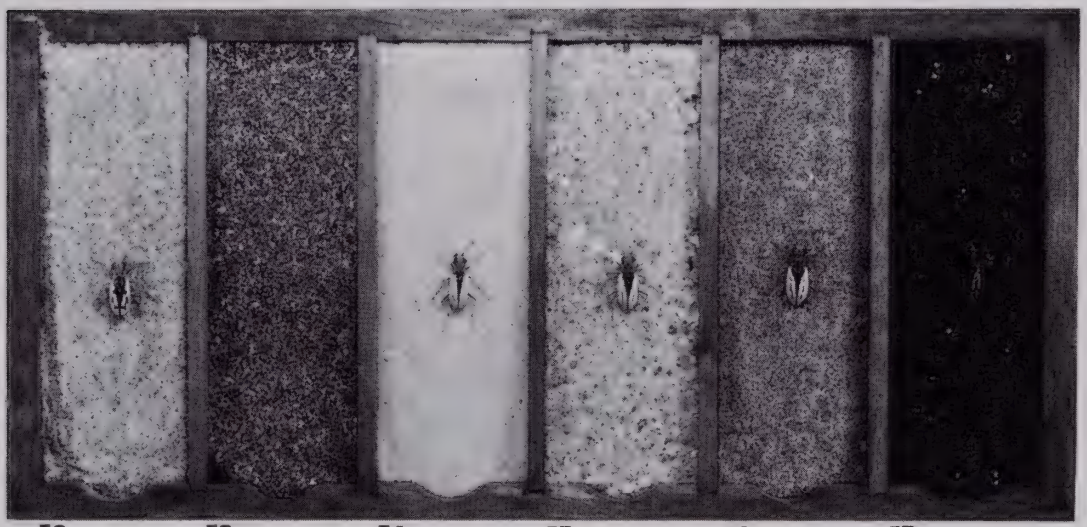
Ninety Mile Beach (actually ca. 90 km long) extends along the west coast of the narrow northernmost peninsula of the North I. There are only a few direct access points which are indicated here by the name of the district behind them. From Ahipara at the south end to Hukatere, sands are dark cream and specimens have the *perhispida* pattern. After investigations in that area and on the far northern coast it was found that the *giveni* pattern occurred on tiger beetles at Te Paki and the Bluff, towards the northern end of Ninety Mile Beach. Subsequently the trip meter of a vehicle was used to measure distances of collecting places along the beach from Hukatere to The Bluff, 30.5 km to the north, where only the *giveni* pattern was found. At Te Werahi Beach, further north, dark marks are somewhat variable and colour is darker on some specimens. Although the beach fore-dune sand is pale, there is an outcrop of yellow sand on cliffs behind the beach. The same mustard yellow sand occurs on the surface some 3.6 km inland from Hukatere and a yellowish-cream tiger beetle with typical *perhispida* pattern has been collected there.

On the northern coast of the peninsula, in Spirits Bay, the beach at Kapowairua (Fig. 55) has very pale sands with small shell pieces and the elytral dark marks on specimens are very reduced and on some very faint with colour a very pale cream. From Parengarenga Hbr. south there are long beaches of glistening white quartz sand which extends to the tip of Karikari Pen. At Rarawa Beach (Fig. 54) and on the Karikari Pen. tiger beetles are clear white with the *giveni* pattern of dark marks — very reduced, very faint or absent (except for the sutural mark).

Beaches on the north-east coast of the North I., from east of Karikari Pen. (Fig. 53) almost to Whangarei Hbr. have pinkish-brown sand and, despite searches over many years, tiger beetles have not been found. On this coast there are also not the long beaches, or groups of beaches, as elsewhere in the area under consideration.

South of the Whangarei Hbr. on the east coast, long whitish beaches stretch southwards from Marsden Point (Fig. 52) to Pakiri but the sand has a different

appearance from white sand in the far north. Tiger beetles have a uniform dull white colour and the *brevilunata* pattern of dark marks.



Figs. 52-57. Sand and tiger beetles. 52. Marsden Pt. Specimen with *"brevilunata"* pattern. 26.II.1988. ♀. 53. Taipa, east of Karikari Pen. Tiger beetles absent. 54. Rarawa Beach. Specimen with *"giveni"* pattern. 23.III.1988. ♀. 55. Kapowairua, Spirits Bay. Specimen with *"giveni"* pattern. 23.II.1988. ♀. 56. Mitimiti. Specimen with *"perhispida"* pattern. 4.II.1988. ♀. 57. South side Waikato R. Heads. Specimen with *"campbelli"* pattern. 4.IV.1988. ♀.

Coastal sand-dunes and sand appearance

In the areas of the North I coast-line where tiger beetles have been collected the beaches are usually backed by a line of fore-dunes up to ca. 10 m high, occasionally higher.

On the southern west coast where ocean drift has brought black ironsands from further south, winds may have driftted sands inland. While the beaches may be very black, sand on the surface of dunes may be lighter with the ironsands in windrows, patches or hollows. The beach on the south side of the Waikato River mouth (Fig. 58) extends along a sandspit with low dunes and patches of lighter and darker sands. At Muriwai Beach a line of fore-dunes is much darker at the south end and the sands gradually become paler northwards, with the ironsands patchy. Beyond ca. 12 km from the south end, sands are distinctly lighter in colour being a more uniform dark grey. However, the sand inland is whiter. The part of Muriwai Beach ca. 8.5-10.7 km north is west of Woodhill and is the area described by Walker (1904) as being of "clean white sand". Most of this area behind the beach is now covered in pine forest.

From Baylys Beach northwards sands are dark cream to cream in colour which arises from the presence of orange-coloured pieces in the sand. At Baylys Beach there are only low sand-dunes or a sand bank (ca. 2-3 m high) at the foot of cliffs but south of Maunganui Bluff there are open low sand-dunes. There are low dunes at the Waimamaku beach (Fig. 59), beside and north of the river, with variations in the sand. Much is a creamy colour but there are areas of whitish cream sand being partially of coarse clear grains. At the North Head of Hokianga Harbour very high (over 153 m) exposed sand-dunes stretch northwards between the harbour and the sea but at Mitimiti further north there is only a line of low dunes of pale cream sand. Sand-hills at Tauroa Peninsula are again very high (over 153 m) sloping down to low dunes at beach level.

From Ahipara northwards along Ninety Mile Beach sand-dunes are low and the sand is dark cream as far as Hukatere. The sand then gradually becomes paler and is noticeably paler at The Bluff (30.5 km to the north) and paler again at Te Paki near the north end of Ninety Mile Beach.

At Hukatere there is pine forest up to 5 km from the beach but in clearings a mustard yellow sand occurs with harder more compact outcrops containing dark brown veins. A similarly coloured stratum is obvious high in coastal sand cliffs at Baylys Beach and at The Bluff. It also occurs in cliffs at Te Werahi on the north-western coast where it has contributed to the colour at the top of the cliffs and on sand flats below.

The fore-dunes at Te Werahi are very low and the sand is pale cream. On the extreme northern coast in Spirits Bay, the fore-dunes are very low and the sand at Kapowairua (Fig. 60) is very pale cream with windrows and patches of small polished white shell pieces.

At Rarawa Beach there is a line of fore-dunes of a very fine glistening white quartz sand. The sand is the same in a small bay on the north-west point of Karikari Pen. where it is banked up a little at the top of the beach.

South of the Whangarei Hbr. a line of fore-dunes stretches from Marsden Pt. (Fig. 61) to Ruakaka, Uretiti and, south of the Waipu River, Waipu Cove. The sand is greyish white, with elongate black pieces, as it is further south at Te Arai and Pakiri where there is a line of very low fore-dunes.

Sand composition on northern coasts

It is an interesting chance that almost continuous beach and dune sands of the northern North I show a range of colours from black ironsands on the southern west coast through light coloured sands to white glistening quartz sands on the far northern east coast.

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Figs. 58-61. Beaches. 58. South of Waikato R. Heads (S. end). 59. Waimamaku, S. of Hokianga Hbr. 60. Kapowairua, Spirits Bay. 61. Marsden Pt., looking south to Ruakaka (far left).

The black ironsands apparently derive from the Taranaki andesites of Mt Egmont (Williams 1974: 135) and have been drifted northwards by coastal sea currents as far as Muriwai Beach west of Auckland (Schofield 1970, Williams 1974). Nicholson & Fyfe (1958) recorded the magnetically separable ironsand concentrations along that coast. While there are variations in the percentages at various localities there is a distinct drop along Muriwai Beach from 10% 3.2 km (2 miles) north of Muriwai to 2% at 4.8 km (3 miles) and less than 1% 6.4-48.2 km (4-30 miles) north.

J.C. Schofield, in his paper on coastal sands of Northland and Auckland (Schofield 1970), presented data for the coastal areas under consideration in the present study. In general, coastal sands from Waikato River area have high mafic content (which includes black ironsands), low quartz and medium residue (mainly rock fragments) percentages (ibid. Table 1). On Muriwai Beach there are high mafics, low quartz and low residues at the south end; medium values for mafics and quartz, low for residues towards the north (ibid. Table 3, Fig. 6). Further north to Hokianga and North Cape (ibid. Tables 4,5) there are some increases in quartz with mafics and residues remaining low, including a further quartz increase at Spirits Bay on the extreme north coast (ibid. Table 5). South of Parengarenga Hbr. on the far northern east coast the quartz percentages are very high (over 90%) and only a little less southwards to Karikari Pen., with almost no mafics or residues (ibid. Table 5, p.795). There is a major change east of Karikari Pen., the north-east coast is typified by low-medium quartz, low mafics and medium-high residue content (rock debris) which accounts for the pinkish-brown colour of the sands (ibid. Table 6, p.798). From the Whangarei Hbr. area south to Pakiri there is another major change with the occurrence of greyish white sands. Percentages of quartz are low-medium, mafics and residues are low but soda-calc feldspars, which elsewhere are mostly low (occasionally low-medium), are here high being over 60% (ibid. Table 7, p.804).

The sands of the northern coast-line thus show both gradual changes and distinct compositional differences in areas of interest in this study.

COASTAL TIGER BEETLES

Local and seasonal activity

Coastal tiger beetles occur on sand-dunes behind ocean beaches on northern North I coasts. In the summer season they are typically active on the front of fore-dunes and forage at the top of beaches. However, they are often more common beside beach entrances and stream banks where streams debouch through the dunes. Presumably these breaks in the dunes allow off-shore breezes, even if light airs, to carry a food supply of small insects to the dune banks and the streams supply flying aquatic insects. Tiger beetle colonies are able to tolerate human activity even on frequently used beaches where active beetles are sometimes seen between groups of picnickers. Permanent habitation along beaches may, however, affect colonies.

The greatest restriction for tiger beetle colonies appears to be vegetation. Behind many ocean beaches there are now farm pastures or pine forests. On the dunes, vegetation such as marram grass is further restricting the open sand spaces where tiger beetles run. They often fly out from cover and drop onto open sand to forage. The flight and run are typically quick and short, and are interspersed with motionless pauses.

These beetles fly actively in the sun but disappear suddenly if a cloud obscures it. However, they can be active in times of more diffuse light such as late in the afternoon or when a thin sheet of cloud is present.

At Pakiri, late in the season, they were found around the edges of damp sand flats behind dunes (where there were dense concentrations of small flies). Elsewhere they can occur on the backs of fore-dunes or in sheltered hollows.

Seasonal. Specimens do not seem to have been taken earlier than December but this may not represent the earliest for coastal tiger beetle activity in a summer season.

Previously the latest activity noted after the summer season was a group of specimens collected at Pakiri on 1 April 1961 by J.C. Watt and specimens taken at Bethells beach by the author on 1 April 1969.

Towards the end of the 1987/88 summer season, in early March 1988, Tropical Cyclone Bola caused havoc in the North I as it moved southwards and both east and west coasts were affected. Fore-dunes were wave-cut and subsequently much wind-blown loose sand was deposited on frontal dunes. While tiger beetles were still active later in March and early April few have been seen since. Gales have caused further wave-cutting and have covered parts of fore-dunes with sand to over 30 cm in many places, which may have affected the season for beetle activity. During the March-April period it was noticeable that tiger beetle activity was almost entirely behind the fore-dunes.

The first visit made by the author to Pakiri on the east coast was on 12 April 1988, when tiger beetles were still active around the edges of damp sand flats (occasionally flooded) behind the low dunes. The next day one was taken at Baylys Beach on the west coast but there were none further north. In the far north no tiger beetles have been seen on Ninety Mile Beach in April, May, June or July and the last four at Rarawa Beach were seen on 19 May.

Some tiger beetles were active between Te Arai and Ruakaka on the east coast in late April and at Pakiri and Uretiti on 17 May. Three were seen at Pakiri on 22 June but none later in June at Uretiti, Ruakaka, Hukatere or Rarawa beaches. None were seen at Hukatere or Rarawa later in July but one individual was found moving slowly on the sand at Uretiti on 22 July 1988.

Colours

Colours which may be seen from the front or above are basically the dark ground-colour (dark marks) and the paler colour markings. However, strong white setae scattered over the head, basal antennal segments, thorax, legs and the wide basal area of the sutural streak on the elytra partially obscure these dark areas and give them a more or less paler appearance.

Labrum. This is pale, similar to the elytral colour, with sometimes small brown spots, at the bases of prominent setae across the middle, and always with a short brown median tooth distally.

Head and thorax. Both are dark, the black ground-colour usually with more or less reddish or greenish metallic sheen.

Antennae and legs. Two basal segments of the antennae and femora of the legs are dark. Antennal segments 3 and 4 are pale as are the tibiae of the legs. The remaining antennal segments distally are dark as are the distal ends of the tibiae and the tarsal segments. The whole effect is to break up the outline around the body.

Elytra. The dark ground-colour is basically black (as it appears macroscopically) often with reddish meteallic sheen (seen more when magnified under bright light) and with many metallic green spots which are mostly blue-centred. The background colour of the dorsum (thorax and elytral dark marks) varies in appearance with light and magnification. However, east coast *Neocicindela brevilunata* show the reddish sheen more. West coast "*perhispida*" and northern "*giveni*" show more green with the greenest being from Ahipara on Ninety Mile Beach. The darker "*campbelli*" show as a dull black.

Elytral colour of west coast specimens is mostly in shades of cream but can be more or less yellowish. Specimens from the far north coast are very pale cream in colour and from the adjacent east coast are clear white. On specimens from Marsden Pt. southwards on the east coast the colour markings are dull white. There are occasional small dark spots on the pale areas (of specimens from any coast), particularly basally and apically, and sometimes a dusting of fine spots over the whole pale colour area.

Elytral markings

The description of *perhispida* by Broun (1880) is simple as he recognised the dark groundcolour was reduced so that the dark marks represented the form of an anchor. His description of *campbelli* (Broun 1886), however, is a compelte contrast as he described the pale colour pattern which made for a complicated description.

The same difficulty was found by Horn (1926b) who gave a latin description of the colour pattern for *brevilunata*, then explained the colour patterns of *campbelli*, *perhispida* and *brevilunata* in the following text, but he made a distinction between the last two clear by turning to the form of the dark marks in his last sentence.

Consequently the anchor analogy is used here for the sake of simplicity. The form is a stylised pick anchor with two curved flukes at the distal end of a shaft, and a cross stock towards the inner end (but necessarily transverse in the same plane as the flukes).

The Neocicindela perhispida pattern (Figs. 12-45). The basic pattern of dark marks on *perhispida* specimens, on light-coloured sands from the northern west coast of the North Island (Muriwai to Ninety Mile Beach), is of anchor form. The shaft lies on the elytral suture and is widest near the base tapering sharply to the stock then continuing to about three-quarters. From the terminal end of the shaft the base of each fluke is curved beyond the end of the shaft then straightens anteriorly to the point which is recurved (hooked) more or less postero-laterally; the point is pointed or thinly truncate and the postero-lateral extension usually elongate. The stock is thin and transverse basally with thinning distal extensions angled antero-laterally.

The darker *campbelli* pattern can be seen to be a thickening of the *perhispida* pattern, together with extension of the stock to (or almost to) the lateral edges, on specimens taken further south (from Muriwai) getting darker on the darker ironsands southwards. At the type locality (Waikato Heads) the thick-lined anchor form can still be seen but further south at Kawhia the pattern is darkened more by the presence of a dark streak along the lateral edges joining the fluke and the traverse stock on each side.

Conversely, the *giveni* pattern (recorded by van Nidek 1965), on specimens from pale or white sands in the far north, is seen to be a reduction of the thin *perhispida* pattern with a loss of the transverse stock and the flukes represented by only two short curved lines or also entirely lost.

The intermediate areas between these three pattern forms are two long beaches, Muriwai Beach in the south and Ninety Mile Beach in the north. At the south end of Muriwai Beach, where ironsands still occur, the dark pattern is thicker as in *campbelli* but as the ironsands diminish the pattern also gradually changes and dark marks thin out into the *perhispida* pattern 10-20 km to the north. On Ninety Mile Beach the *perhispida* pattern continues to Hukatere but reduces as the sand gets paler between there and the Bluff 30.5 km to the north. The *perhispida* marks gradually thin then reduce into the *giveni* pattern 19-26 km north of Hukatere.

While these gradual progressive changes can be seen, they are not absolute and occasional specimens on both sides of the immediate change zone can show tendencies to the patterns of the other side. At Waimamaku beach, south of Hokianga Harbour, specimen patterns are quite variable and the *giveni* forms are present there, a long way (*ca.* 90 km) south of the actual change zone.

As *perhispida* is so variable the stock (median dark transverse bar) is often reduced, particularly at the base which makes it even less like the stock of *brevilunata*. There are just a very few specimens (2 or 3) seen so far where the stock is reduced distally (see Fig. 35), somewhat approaching the form of the short truncate stock of *brevilunata*, but on these specimens the distal flukes remain distinctly of the *perhispida* form.

The overall picture is that there is one continuous series of patterns starting with the almost entirely black pattern, on the southern west coast ironsands, which lightens on paler sands to the north and which almost entirely disappears on the palest sands of the most northern beaches and the white sands of the east coast far northern beaches.

The Neocicindela brevilunata pattern (Figs. 46-51). This occurs on specimens from east coast localities south of the Whangarei Harbour. It is a bold anchor pattern with the shaft tapering evenly to the distal end. The base of each fluke is broad with a postero-lateral angle so that the two together give the appearance of a straight transverse band. Each fluke thins anteriorly before the point which is recurved (hooked) postero-laterally; the point is broadly truncate and the postero-lateral extension is short. The transverse stock is short, broad and truncate with a slight posterior extension distally on each side, the whole straight distal edge slightly angled inwards towards the posterior.

A slight variation sometimes seen in *brevilunata* is also in the stock where the base is thickened posteriorly, tending to fill in the space to the distal posterior extension so that the whole appears thicker and even more unlike the stock of *perhispida*.

Sizes

The median lengths (front of head to tip of elytra) fall within the same range for the two species except for a few larger females. Ranges given here are from a selection of specimens taken at different localities.

Lengths. *Neocicindela perhispida* ♂♂ 8-9.5 mm ♀♀ 9-10.5 mm.
Neocicindela brevilunata ♂♂ 8-9.5 mm ♀♀ 9-10.0 mm.

Consideration of species and subspecies

Freitag (1979) in considering Australian *Cicindela* species stated that characters used for identification are pubescence, coloration and shapes of sclerites or appendages and the genitalia of females. He also considered that body and appendage colour and colour pattern are most important in distinguishing species, including the shapes of markings on the elytra. The criteria used for the separation of species and subspecies were also given. Freitag indicated that a distinct difference in any one character was sufficient to distinguish between them.

The New Zealand species under discussion here, under the names of *Neocicindela perhispida* (Broun, 1880) and *N. brevilunata* (Horn, 1926), are clearly allopatric and separated by distinct differences in the elytral patterns. However, the previously recognised three subspecies of *N. perhispida* are here shown to be one continuous series with elytral pattern varying according to sand colour. Consequently, it is considered here that they are not true subspecies and the previous subspecific names are used as pattern or varietal names only.

Freitag (1979) used female genitalia for *Cicindela* species but they are all of very similar form. Rivalier (1963) figured the male genitalia of one New Zealand species but mainly to demonstrate generic differences. Genitalia of a few specimens of northern coastal tiger beetles have been examined superficially but no obvious differences were seen and they are not considered further within the scope of this paper.

NOMENCLATURE

The two northern species of coastal tiger beetles (Coleoptera:Cicindelidae) are listed with synonymic lists of references of importance in nomenclature. Specimens in overseas collections, examined recently by the author, are all included, with the addition of type specimens of *Neocicindela perhispida giveni* in New Zealand.

In view of the extensive collections recorded above (Table 1) it is not felt necessary to record all specimens held in New Zealand collections as they are readily available and all those seen confirm the observations made.

Abbreviations for collections

BMHN(Broun)	—	Broun Collection in British Museum (Natural History), London.
BMNH(Ent)	—	Main Entomology Collection in British Museum (Natural History), London.
BPBM	—	Bernice P. Bishop Museum, Honolulu.
ATIE(Horn)	—	Horn Collection in Abteilung Taxonomie der Insekten, Institut für Pflanzenschutzforschung, Eberswalde (previously Deutsches Entomologisches Institut).
MNHN	—	Muséum National d'Histoire Naturelle, Paris.
NZAC	—	New Zealand Arthropod Collection, Entomology Division, D.S.I.R., Auckland.

In the following specimen data, separate labels are indicated (by a stop and space) wherever possible and numbers of specimens are given in brackets where necessary.

Genus *Neocicindela* Rivalier, 1963

Neocicindela Rivalier, 1963 *Rev. franç. Ent.* 30(1):36.

Neocicindela perhispida (Broun, 1880)

Cicindela perhispida Broun, 1880, *Manual N.Z. Coleoptera*, 4.
Cicindela campbelli Broun, 1886, *Manual N.Z. Coleoptera*, 817.
Cicindela perhispida var: Horn, 1892, *Deutsche Ent. Zeitschr.* 1892: 97.
Cicindela perhispida var. *brouni* Horn, 1893, *Deutsche Ent. Zeitschr.* 1893: 336.
Cicindela campbelli: Horn, 1896, Stett. Ent. Ztg. 57: 171 (*C.perhispida* var. *brouni* Horn, 1893, as syn.).
Cicindela perhispida: Horn, 1915, *Genera Insectorum* Fasc. 82c: 319.
Cicindela campbelli: Horn, 1915, *Genera Insectorum* Fasc. 82c: 319.
Cicindela perhispida campbelli: Horn, 1936, *B.P. Bishop Mus. Occ. Pap.* 12 (6): 11 (*C.campbelli* Broun, 1886, as subspecies).
Neocicindela perhispida: Rivalier, 1963, *Rev. franç. Ent.* 30 (1): 37.
Neocicindela perhispida campbelli: Rivalier, 1963, *Rev franç.* Ent. 30 (1): 37.
Neocicindela perhispida perhispida: van Nidek, 1965, *N.Z. J. Sci.* 8:353.
Neocicindela perhispida campbelli: van Nidek, 1965, *N.Z. J. Sci.* 8: 353.
Neocicindela perhispida giveni van Nidek, 1965, *N.Z. J. Sci.* 8: 353.

"perhispida"

BMNH(Broun). New Zealand Broun coll. Brit. Mus. 1922-482. Type. ♂. 9. Whangarei. Cicindela perhispida.

The type label (printed in red) may have been added at BMNH. "9" is Broun's species number for this species. Whangarei is not a collecting locality. This is the only Broun specimen of the west coast species remaining in the BMNH collections but could not be a syntype if it did not come from Hokianga.

MNHN. New Zealand Broun coll. Brit. Mus. 1922-482. Marsden Point ♂. Museum Paris Ex Coll. M. Maindron. Coll. G. Barbault 1930.

This also is typical of the west coast species and could not have been collected at Marsden Pt. MNHN received the Barbault collection which included the collection of Maindron who would have received the specimen from BMHN.

BMNH(Ent). Woodhills Auckland New Zealand 21 Jan 02. New Zealand J.J. Walker 1905-96. Cicindela perhispida Broun (4). Woodhills New Zealand J.J. Walker bequest 1939. Brit. Mus. 1948-129. Cicindela perhispida Broun E.B. Britton det. 1946 (2).

These specimens have thicker dark marks tending towards the *campbelli* pattern.

N. Zealand H. Swale 1913-117. 1182 (2). N. Zealand H. Swale 1913-117. 1176 (1).

The "1182" specimens have thicker dark marks tending towards *campbelli.*

New Zealand G.C. Champion Coll. B.M. 1927-409 (4).

These are also specimens with slightly thicker dark marks.

90-mile Beach N. Auck. 11.1.27 A.R. 90 Mile Beach Mangonui 11.1.27. A Richardson. New Zealand C.E. Clarke Collection B.M. 1957-24 (4). Ninety-mile Beach N. Auck. 11.1.27 C.E.C. New Zealand C.E. Clarke Collection B.M. 1957-24. 90 mile beach C.E. Clarke (2).

BPBM. Woodhills NZ 1902 J. Walker. Cicindela perhispida Broun (3). [No data.] Cicindela perhispida (2).

These specimens are typical *perhispida.*

ATIE(Horn). Woodhills NZ 1902 J.J. Walker. Sharp Coll.1905-313. New Zealand. Brit. Mus. Coll. W. Horn. DEI Eberswalde (1). Woodhills N.Z. 1902 J.J. Walker, Sharp Coll. Brit. Mus. Coll. W. Horn DEI Eberswalde (1).

Neú Seeland Nord Insel. Kaipara Harbour bei Hobianga det. Brooks 1935. Coll. W. Horn DEI Eberswalde (3).

Apart from mis-spelling, one handwritten label on each specimen indicates Kaipara Harbour near Hokianga determined by Brookes in 1935.

"campbelli"

BMNH(Broun). New Zealand Broun coll. Brit. Mus. 1922-482. New Zealand. 1451. ♀.

"1451" is Broun's species number for *campbelli.* This is the only specimen in BMNH collections which could be a syntype of that species and it is typical of the southern ironsands area of the northern west coast.

New Zealand Broun coll. Brit. Mus. 1922-482. Manukau. ♂. Cicindela campbelli.

Also a dark specimen from west coast ironsands.

BMNH(Ent). N. Zealand H. Swale 1913-117. 1183.

This specimen has the typical *campbelli* pattern (see also note to Swale specimens recorded above under *perhispida*).

New Zealand Broun Coll. Brit. Mus. 1922-482. Manukau. 145k. ♀(1). New Zealand Broun Coll. Brit. Mus. 1922-482. Kerikeri 23.2.1916. 1451 ♂. C. perhispida campbelli Broun R.D. Pope 1972 (1).

The present author has added a note to the last specimen "West coast subsp. on black ironsands. Locality prob. Karekare, nr. Auckland", as Kerikeri is in the east coast area where coastal sand-dune tiger beetles do not occur (Fig. 11).

New Zealand C.E. Clarke Collection B.M. 1957-24. Muriwai Beach 5.3.27 C. campbelli (1). New Zealand C.E. Clarke Collection B.M. 1957-24. Piha 1.1.34 (1).

MNHN. Museum Paris Nouv. Zelande H. Deyrolle 1885. 85. campbelli Brn var Horn 96. èdèage 1942 Rivalier. perhispida campbelli Broun.

This specimen has an aberrant (or stained) *campbelli* pattern.

Waikato. Museum Paris. Nlle Zelande 1912 Th. Broun. èdèage 1918 Rivalier.

ATIE(Horn). Reisch.1981 Neuseeland ex coll. Wien Mus. Type! Dr W. Horn. Syntypus. Coll. W. Horn DEI Eberswalde.

This specimen is in the collection as *C. brouni* Horn but Horn (1893) used the name *brouni* for a variety (of *C. perhispida*) which he subsequently (1896) synonymised with *campbelli*. It is a large *"campbelli"* typical of the coast from Waikato Heads northwards. The label "Reisch. 1891. Neuseeland" is printed and presumably indicates the Reischek collection deposited in the Vienna Museum in 1891. Andreas Reischek was an Austrian who made large natural history and ethnological collections in New Zealand between 1877 and 1889 (see King 1981).

Neu Seeland. Coll. W. Horn DEI Eberswalde (1). coll. V de Poll. Coll. W. Horn DEI Eberswalde (1). Karekare W. Coast Auckland New Zealand. Coll. A.E. Brookes 12.2.1916. Cicindela campbelli Broun Identified by A.E. Brookes. Coll. W. Horn DEI Eberswalde (1). Port Waikato W. Coast (N.Z.) T. Cockcroft 27.XII. 1925. Coll. W. Horn DEI Eberswalde (2).

Waikato Heads Haireburn 10.1.32. Coll. W. Horn DEI Eberswalde (7). Karekare Beach Auckland [?] Hairburn 1.32. Coll. W. Horn DEI Eberswalde (3).

Collectors names on handwritten labels are errors for Fairburn. There are still four specimens in the E. Fairburn collection, taken by Fairburn himself; two from Waikato Heads on 10.1.32 and two from Karekare on 12.1.32.

"giveni"

NZAC. Spirits Bay, 10.1.57, B.B. Given. Holotype. Cic. perhispida giveni n.s.sp. Det. C.v. Nidek. Spirits Bay, 10.1.57, B.B. Given. Allotype. Cic. perhispida giveni n.s.sp. Det.C.v. Nidek.

There are also paratypes with the same data in NZAC but none were seen in BMNH.

BMNH(Ent). Spirits Bay 11.1.1957 R.A. Cumber Coll. B.M. 1985-344 (2).

Typical *giveni* taken the day after the types.

Neocicindela brevilunata (Horn, 1926)

Cicindela brevilunata Horn, 1926, *Ent. Blätt.* 22 (4): 168.
Cicindela perhispida Horn, 1915, *Genera Insectorum* Fasc. 82c, pl.18 fig.9 (nec Broun, 1880).
Cicindela brevilunata Horn, 1926, *Ent. Blätt.* 22 (4): 168 *(C.perhispida* Horn, 1915, Pl.18 fig.9, as syn.).
Neocicindela brevilunata: Rivalier, 1963, *Rev. franç. Ent.* 30 (1): 37.
Neocicindela brevilunata: van Nidek, 1965, *N.Z. J. Sci.* 8: 353.

BMNH(Ent). New Zealand. Sharp Coll. 1906-313. [?]. Broun. Type. "Cicindela albohispida or perhispida". Cicindela brevilunata type ♀ W.H. Dr. W. Horn det 1926.

This is presumably a Broun specimen sent to Sharp and later received at BMNH. The type label (printed in red) may have been added at BMNH. This specimen should be considered as the primary type as it was the first of the three specimens recorded by Horn (1926b) and, besides various printed type labels on the three specimens [see also below under ATIE(Horn)], it is the only specimen bearing a personal label as "Cicindela brevilunata type ♀ W.H." It is typical of this east coast species.

51604. Broun. Type. Nov.Zel. Fry Coll. 1905-100. Cicindela perhispida Broun N. Zealand Type. (Fry catalogue: 51604 Cicindela perhispida Broun Man. N.Z. Col. p.4 Type New Zealand Auckland (9) Capt. Broun. BMNH Catalogue: 1905-100 Fry Collection).

This appears to be an original specimen of *Cicindela perhispida* Broun sent to Fry. It is a typical east coast specimen but was not recorded by Horn (1926b) and is not a type of *brevilunata.*

Ruakaka Beach E. coast N.Is. N. New Zealand. 13.12.1951 A.E. Brookes. Cicindela brevilunata Horn Det. A.E. Brookes. Brit. Mus. 1952-526 (2).

ATIE (Horn). Hokianga. New Zealand Broun Coll. Brit. Mus. 1922-482. Syntypus. Typus. Type! Dr. W. Horn. Coll. W. Horn DEI Eberswalde.

The "Hokianga" label is a printed one. There are also two labels handwritten in German, presumably by Horn. One starts with "1926" and states he was given the specimen by Arrow and that it is possibly the first specimen mentioned in the description by Broun or a specimen given to him later from the same locality. The other states that it is Broun's "Holotype" according to A.E. Brookes (NZ). It is the second specimen recorded by Horn (1926b). The specimen itself is in the collection as *C. brevilunata* Horn and, although the right elytron is damaged (apical three-quarters missing), the pattern on the left elytron is typical of the east coast species.

N. Zeeland. Syntypus. Type W Horn. Coll. W. Horn DEI Eberswalde.

This, the third specimen recorded by Horn (1926b), is also clearly the east coast species.

Waipu N. Auckland New Zealand. Coll. A.E. Brookes 2.1.1914. Coll. W. Horn DEI Eberswalde (1). Waipu N. Auckland New Zealand. Coll. A.E. Brookes 2.1.1914. Cicindela perhispida Broun Identified by A.E. Brookes. Coll. W. Horn DEI Eberswalde (1).

These would be the specimens mentioned by Brookes (1944).

Ruakaka Beach North Auckland N.Z. Coll. E. Fairburn 25.3.1932. Ruakaka Beach N. Auckland Fairburn 25.3.32. Coll. W. Horn DEI Eberswalde (1). Ruakaka Beach N. Auckland Fairburn 25.3.32. Coll. W. Horn DEI Eberswalde (13).

MNHN. Museum Paris Nlle Zelande Th. Broun 1912 (2). Marsden Point near Whangarei N.Z. 29.1.24. Museum Paris Nlle Zelande P. Serre 1926. Cicindela perhispida Broun (4).

These are typical *brevilunata.*

The difficulty in considering the nomenclature of *Cicindela perhispida* Broun, 1880 and *C. brevilunata* Horn, 1926 is illustrated in Table 2. All five specimens listed for the former species are Broun specimens which are or have been in the British Museum (Natural History). Of the three listed for the latter species, two are Broun specimens which are listed also under the former species and one is not.

A specimen labelled "Hokianga" (on the west coast) was recorded in the original descriptions of both *C. perhispida* by Broun (1880) and *C. brevilunata* by Horn (1926b). It seems likely that this is the same specimen as Horn (1936) acknowledged that it was from the Broun collection, although he stated there was no proof that it was

Table 2. Identity of specimens recorded in original descriptions of *Cicindela perhispida* Broun, 1880 and *C. brevilunata* Horn, 1926, compared with specimens in collections

Recorded specimens		Specimens in collections		
		Collections	Specimen data	Present determination
C perhispida Broun, 1880				
Hokianga*	1 spec.	Broun/BMNH (Broun)/ ATIE (Horn)	Hokianga	Neocicindela brevilunata (Horn, 1926)
Marsden Pt	several	Broun/BMNH (Broun)/ Maindron/Barbault/ MNHN	Marsden Pt	Neocicindela perhispida (Broun, 1880)
		Broun/BMNH (Broun)	Whangarei	Neocicindela perhispida (Broun, 1880)
		Broun/Fry/BMNH	N Zealand	Neocicindela brevilunata (Horn, 1926)
		Broun/Sharp/BMNH†	New Zealand	Neocicindela brevilunata (Horn, 1926)
C brevilunata Horn, 1926				
N Zealand	1 spec.	Broun/Sharp/BMNH†	New Zealand	Neocicindela brevilunata (Horn, 1926)
Hokianga*	1 spec.	Broun/BMNH (Broun)/ ATIE (Horn)	Hokianga	Neocicindela brevilunata (Horn, 1926)
N Seeland	1 spec.	ATIE (Horn)	N Seeland	Neocicindela brevilunata (Horn, 1926)

*Presumed to be the same specimen. † The same specimen.

the original specimen. However, Horn determined the specimen he held as the east coast *C. brevilunata*. The specimen now in MNHN labelled Marsden Point is the west coast species, *perhispida*. It is seen that there are specimens from both coasts incorrectly labelled. Dr J.C. Watt has advised (pers. comm.) that there are similar east coast/west coast errors known to him in the labelling (or recording) of other Broun Coleoptera.

Of the five Broun specimens, three are from the east coast (presently determined as *Neocicindela brevilunata*), two of them being conspecific with the third which was labelled by Horn as the type of *brevilunata*. The other two are the west coast species (presently determined as *Neocicindela perhispida*) but are not original specimens of that species if they did not come from Hokianga, and only one specimen was so recorded by Broun (1880).

Discussion

The range and distribution of colour patterns has been demonstrated above from specimens collected around northern North I coasts and the relatiionships have been considered in the section on specimens in overseas collections. The species presently accepted are *Neocicindela perhispida* (Broun, 1880) of the west coast of the North I, extending around the far northern coasts to the far north east coast, and *Neocicindela brevilunata* (Horn, 1926) of the east coast south of Whangarei Hbr. It is seen that the *brevilunata* entity is clear as it has a type specimen so labelled by the author of the species name (Horn 1926b) and an excellent colour figure published by the same author (Horn 1915). Specimens (collected more recently) considered to be conspecific in colour and colour pattern are all from the east coast of the northern North I (south of Whangarei Hbr) where the species occurs on greyish-white sand of a particular composition (which differs from sands elsewhere on the North coasts examined).

However, the earlier *perhispida* entity is confused by mis-labelling (mis-recording) of localities. It has always been accepted as the west coast species as the author of the species name (Broun 1880) included a reference to a west coast (Hokianga) specimen which he considered to be conspecific with other specimens from the east coast (Marsden Pt.). The only specimen now known to be labelled "Hokianga" was included by Horn (1926b) as a specimen of *brevilunata* and consequently appears to be a mislabelled east coast specimen. Other specimens from the Broun collection have been examined but none are dated so whether they were collected prior to the publication date (1880) cannot be determined. Several available specimens which earlier were considered as *perhispida* are also now determined as the east coast species *brevilunata*.

If the two original descriptions are now re-examined in reference to the dark transverse median mark on the elytra (the anchor stock), it is found that the mark of *brevilunata* was described in the german text (Horn 1926b) as ". . . . eine kurze, breite, horizontale Ausbuchtung." — a short, broad, horizontal excavation [in the pale colour]. Broun (1880) has described the ground colour dark pattern as ". . . . an elongate triangular patch extending nearly to the apex, sending forth a short

transverse band near the middle . . . ." It is considered by the present author that Broun had in fact described the east coast species from Marsden Pt. specimens. Consequently both Broun's 1880 and Horn's 1926 descriptions of the elytral marks were based on specimens of the same species. The taxonomic implications of these findings should be considered elsewhere.

CONCLUSION

Examination of coastal tiger beetle specimens of known locality from northern North I coasts, shows that two species can be easily recognised and separated by the colour and colour pattern of the elytra.

One variable species, currently known as *Neocicindela perhispida* (Broun, 1880), occurs on sand-dunes from Kawhia up the west coast and around the northern coast to the far northern east coast as far south as Karikari Pen. The other species, which has little variation and is currently known as *Neocicindela brevilunata* (Horn, 1926), occurs on sand-dunes along the east coast beaches south of the Whangarei Hbr. from Marsden Pt. to Pakiri.

However, examination of specimens in early collections (which are largely not localised or dated, or which are labelled [or recorded] in error) together with original descriptions of the two species concerned indicates that the taxonomic situation is not clear and that the species need to be re-affirmed.

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LACEWINGS AND AQUATIC INSECTS OF NEW ZEALAND

4. New records and further distributions for Neuroptera

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Abstract. An Australian species of Hemerobiidae has recently been described and the species is now recorded for New Zealand. A further northern record is given for an endemic Hemerobiid species. A species of Coniopterygidae and one of Chrysopidae are each recorded from a single specimen.

An Australian Hemerobiid species, known in New Zealand for many years, has now been described in Australia and the species is subsequently recorded by name here. Northern occurrences of an endemic Hemerobiid species are discussed.

Two other species a Coniopterygid and a Chrysopid are each recorded from one specimen collected recently.

Specimens are in Auckland Museum (AMNZ), National Museum, Wellington (NMNZ) and the Arthropod Collection in Entomology Division, D.S.I.R., Auckland (NZAC).

Family CONIOPTERYGIDAE

Genus *Heteroconis* Enderlein, 1905

Heteroconis Enderlein, 1905, Zool. Anz. 29: 226.

Heteroconis ornata Enderlein, 1905

Heteroconis ornata Enderlein, 1905, Zool. Anz. 29: 226.

NZAC. Auckland, Lynfield, in house at night, 25.VII.1988 (1♂), B.A. Holloway.

This Australian species is recorded by Meinander (1969, 1972) from New South Wales and Queensland. He also noted (1972) that males have been taken at light and that immatures were unknown. Consequently, it is not known if this live specimen indicates a species established in New Zealand or an importation (see *Chrysopa* sp. below).

The only other known Coniopterygid species in New Zealand is *Cryptoscenea australiensis* (Enderlein, 1906), also common to Australia, which has plain wings without dark marks. *Heteroconis ornata* is white with prominent dark marks on the wings (Fig.1).

Fig. 1. *Heteroconis ornata* End., 1905. Wing pattern of New Zealand specimen.

Family HEMEROBIIDAE

Genus *Psectra* Hagen, 1866

Psectra Hagen, 1866, Ent. Ztg., Stettin. 27:376.

Psectra nakaharai New, 1988

Psectra nakaharai New, 1988, Invertebrate Taxonomy 2(3): 351.
Sympherobius group Wise, 1973, N.Z. Ent.5(2): 183.

AMNZ. Ranui, 11.IV.1971 (1♂), 26.IV.1971 (1♂), K.A.J. Wise. Whenuapai, at light, 16.IV.1973 (1♂), P.T. Leaf. Whenuapai, 12.IV.1973 (1♂), 15.IV.1973 (1♂), 25.IV.1973 (1♂), 27.IV.1973 (1♂), 9.V.1973 (4♂♂), 1.XII.1973 (1♂), P.T. Leaf. Palmerston North, 1981 (1♂), I. Andrew. Wanganui City, in house, -.II.1982 (1♀), M.A. Ordish. Wanganui, -.III.1982 (1♀), M.A. Ordish. Wellington, Vogeltown, -.II.1986 (1♀), R.G. Ordish. Auckland, swept ex foliage, courtyard Auckland Museum, 4.X.1982 (1♀), R.F. Gilbert. Paihia, at light, 27.XII.1986 (1♀), K.A.J. Wise.
NMNZ. Wanganui, -.III.1981 (1♂ 1♀), -.IV.1984 (1♀), M.A. Ordish.

This Australian species is very recently described by New (1988) who has also determined some New Zealand specimens for the present author. Consequently,

this is a new record for the genus and the species in this country. In Australia, it is known from New South Wales, Australian Central Territory and Tasmania.

The first specimens taken in New Zealand (Wise 1973: 183, fig.5) were near and from wattle trees at Ranui, west of Auckland. Subsequently, following the author's suggestion, P.T. Leaf collected specimens amongst wattles at Whenuapai, ca. 10 km north of Ranui. He also found an as yet undentified Hemerobiid larva in *Acacia* rust galls, which may suggest an association for this species.

This distribution is seen to be sporadic in the North I from Wellington in the south to Paihia in the Bay of Islands on the east coast of North Auckland.

Genus *Micromus* Rambur, 1842

Micromus bifasciatus Tillyard, 1923

AMNZ. Huia, Karamatura Vy. Swept ex Kahikatea, 15.IV.1982, (1♀) K.A.J. Wise. N.Hokianga, W. of Motuti R. mouth, swept manuka in alluvial Kahikatea forest, 10.X.1985 (1♂) R.F. Gilbert.

Hemerobiid larvae were taken with the adult from Huia, west of Auckland (Wise 1983). The latest record from north of Hokianga Harbour extends the distribution of this species much further north.

It is of interest that both collections were from or amongst Kahikatea trees (*Dacrycarpus dacrydioides* (A.Rich) Laubenf.) which may suggest an association for this species.

Family CHRYSOPIDAE

Genus *Chrysopa* Leach, 1815

Chrysopa sp.

NZAC. Auckland. Mt. Albert, on imported pineapple, 22.VI.1988 (1), J. Wernham.

This specimen was taken alive but that does not necessarily indicate that the species is established. It is a black-veined Australian and/or Pacific Islands species; pineapples are currently being imported from Queensland, Australia.

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Miss Rosemary Gilbert, Auckland Museum, prepared the figure for publication.

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INDEX TO VOLUME 25

Annabell, Angela R.
A Broadwood square pianoforte in the Auckland Institute and Museum.... 57

Birds..... 87

Cernohorsky, W.O.
Arthur William Baden Powell (1901-1987). A brief biography and bibliography with a list of Molluscan taxa..... 1

Taxonomic notes on the *Mitromorpha* group of the Family Turridae (Mollusca : Gastropoda : Borsoniinae)..... 63

The Mitridae, Costellariidae and Nassariidae recently dredged at Reunion Island, Indian Ocean, with descriptions of new species..... 75

Chrysopa sp. 183

Gill, B.J.
Records of birds and reptiles from Tonga..... 87

Great Barrier I 50

Heteroconis ornata 181

Leahy, Anne
Pa and external terraces with structures at Poor Hill (site P5/227), Waimate North..... 39

Mayor I 49

Micromus bifasciatus 183

Mimopeus..... 95

Mimopeus clarkei..... 136

Mimopeus convexus..... 141

Mimopeus insularis..... 125

Mimopeus johnsi..... 140

Mimopeus neglectus..... 120

Mimopeus parallelus 138

Mimopeus parvus 128

Mimopeus turbotti..... 124

Mimopeus vallis..... 132

Mitra (Nebularia) boucheti 76

Mitromorpha group..... 63

Mitromorpha (Anarithma) 65

Mitromorpha (Anarithma) alphonsiana..... 69

Mitromorpha (Anarithma) dorcus..... 72

Mitromorpha (Anarithma) metula..... 66

Mitromorpha (Anarithma) salisburyi 71

Mitromorpha (Lovellona)..... 64

Mitromorpha (Mitrolumna)..... 64

Mollusca 63, 75

Nassarius (Zeuxis) dijki..... 81

Nassarius (Zeuxis) reunionensis 79

Obsidian 49
Pianoforte 57
Poor Hill 39
Poor Knights Is 127
Powell, Arthur William Baden ..... Frontispiece, 1
Psectra nakaharai 182
Reptiles 87
Reunion I 75
Ruddock, R.S.
Source determination of obsidian from the Westfield (R11/898) site using geochemical analysis 49
Three Kings Is 125
Tiger beetles 147
Tonga 87
Vexillum (Costellaria) albatum 78
Waimate North 39
Watt, J.C.
A revision of the Genus *Mimopeus* (Tenebrionidae) 95
Westfield 49
Wise, K.A.J.
Lacewings and aquatic insects of New Zealand. 4. New records and further distributions for Neuroptera 181
Sand-dune tiger beetles of northern New Zealand coasts (Coleoptera : Cicindelidae) 147

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